CAS integration tests. Progress report
Sympy 1.10.1 under Python 3.10.4 vs. Sympy 1.8 under Python 3.8.8

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September 21, 2022 Compiled on September 21, 2022 at 7:30pm

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1 Table summary of progress report

Table 1: Table summary of progress report

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
1	1	145	1 (pass)	-1 (time out)
2	1	146	1 (pass)	0 (not solved)
3	5	123	1 (pass)	-1 (time out)
4	5	237	1 (pass)	0 (not solved)
5	5	275	1 (pass)	-1 (time out)
6	8	70	1 (pass)	-1 (time out)
7	9	251	1 (pass)	-1 (time out)
8	10	86	1 (pass)	0 (not solved)
9	10	217	1 (pass)	-1 (time out)
10	10	396	1 (pass)	-1 (time out)
11	10	505	1 (pass)	-1 (time out)
12	10	510	1 (pass)	-1 (time out)
13	10	582	1 (pass)	-1 (time out)
14	10	663	1 (pass)	-1 (time out)
15	10	704	1 (pass)	-1 (time out)
16	13	365	1 (pass)	-1 (time out)
17	13	438	1 (pass)	-1 (time out)
18	13	682	1 (pass)	-1 (time out)
19	13	683	1 (pass)	-1 (time out)
20	13	688	1 (pass)	-1 (time out)
21	13	689	1 (pass)	-1 (time out)
22	13	692	1 (pass)	-1 (time out)
23	13	693	1 (pass)	-1 (time out)
24	13	694	1 (pass)	-1 (time out)
25	13	695	1 (pass)	-1 (time out)
26	13	741	1 (pass)	-1 (time out)
27	13	742	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
28	13	744	1 (pass)	-1 (time out)
29	13	749	1 (pass)	-1 (time out)
30	13	753	1 (pass)	-1 (time out)
31	13	989	1 (pass)	-1 (time out)
32	13	1136	1 (pass)	-1 (time out)
33	13	1144	1 (pass)	-1 (time out)
34	13	1152	1 (pass)	-1 (time out)
35	13	1383	1 (pass)	-1 (time out)
36	13	1394	1 (pass)	-1 (time out)
37	13	1406	1 (pass)	-1 (time out)
38	14	50	1 (pass)	-1 (time out)
39	14	55	1 (pass)	-1 (time out)
40	14	353	1 (pass)	-1 (time out)
41	14	363	1 (pass)	-1 (time out)
42	14	407	1 (pass)	-1 (time out)
43	14	408	1 (pass)	-1 (time out)
44	14	409	1 (pass)	-1 (time out)
45	14	419	1 (pass)	-1 (time out)
46	14	420	1 (pass)	-1 (time out)
47	14	421	1 (pass)	-1 (time out)
48	14	422	1 (pass)	-1 (time out)
49	14	443	1 (pass)	-1 (time out)
50	14	461	1 (pass)	-1 (time out)
51	14	462	1 (pass)	-1 (time out)
52	14	466	1 (pass)	-1 (time out)
53	14	467	1 (pass)	-1 (time out)
54	14	469	1 (pass)	-1 (time out)
55	14	470	1 (pass)	-1 (time out)
56	14	471	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
57	14	472	1 (pass)	-1 (time out)
58	14	473	1 (pass)	-1 (time out)
59	14	474	1 (pass)	-1 (time out)
60	14	475	1 (pass)	-1 (time out)
61	14	487	1 (pass)	-1 (time out)
62	14	498	1 (pass)	-1 (time out)
63	14	509	1 (pass)	-1 (time out)
64	14	524	1 (pass)	-1 (time out)
65	14	527	1 (pass)	-1 (time out)
66	14	534	1 (pass)	-1 (time out)
67	14	539	1 (pass)	-1 (time out)
68	14	543	1 (pass)	-1 (time out)
69	14	578	1 (pass)	-1 (time out)
70	14	723	1 (pass)	-1 (time out)
71	14	724	1 (pass)	-1 (time out)
72	14	827	1 (pass)	-1 (time out)
73	14	948	1 (pass)	-1 (time out)
74	14	990	1 (pass)	-1 (time out)
75	14	991	1 (pass)	-1 (time out)
76	14	1717	1 (pass)	-1 (time out)
77	14	1752	1 (pass)	-1 (time out)
78	14	1780	1 (pass)	-1 (time out)
79	14	1781	1 (pass)	-1 (time out)
80	14	1782	1 (pass)	-1 (time out)
81	14	1788	1 (pass)	-1 (time out)
82	14	1799	1 (pass)	-1 (time out)
83	14	1800	1 (pass)	-1 (time out)
84	14	1810	1 (pass)	-1 (time out)
85	14	1822	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
86	14	1836	1 (pass)	-1 (time out)
87	14	1837	1 (pass)	-1 (time out)
88	14	1838	1 (pass)	-1 (time out)
89	14	1846	1 (pass)	-1 (time out)
90	14	1847	1 (pass)	-1 (time out)
91	14	1850	1 (pass)	-1 (time out)
92	14	1851	1 (pass)	-1 (time out)
93	14	1854	1 (pass)	-1 (time out)
94	14	1855	1 (pass)	-1 (time out)
95	14	1856	1 (pass)	-1 (time out)
96	14	1903	1 (pass)	-1 (time out)
97	14	1914	1 (pass)	-1 (time out)
98	14	2008	1 (pass)	-1 (time out)
99	14	2045	1 (pass)	-1 (time out)
100	14	2046	1 (pass)	-1 (time out)
101	14	2052	1 (pass)	-1 (time out)
102	14	2057	1 (pass)	-1 (time out)
103	14	2068	1 (pass)	-1 (time out)
104	14	2142	1 (pass)	-1 (time out)
105	14	2185	1 (pass)	-1 (time out)
106	14	2203	1 (pass)	-1 (time out)
107	14	2264	1 (pass)	-1 (time out)
108	14	2274	1 (pass)	-1 (time out)
109	14	2286	1 (pass)	-1 (time out)
110	14	2287	1 (pass)	-1 (time out)
111	14	2361	1 (pass)	-1 (time out)
112	14	2388	1 (pass)	-1 (time out)
113	14	2426	1 (pass)	-1 (time out)
114	14	2468	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
115	14	2479	1 (pass)	-1 (time out)
116	14	3180	1 (pass)	-1 (time out)
117	16	1	1 (pass)	-1 (time out)
118	16	10	1 (pass)	-1 (time out)
119	16	18	1 (pass)	-1 (time out)
120	16	19	1 (pass)	-1 (time out)
121	16	25	1 (pass)	-1 (time out)
122	16	26	1 (pass)	-1 (time out)
123	17	4	1 (pass)	-1 (time out)
124	19	296	1 (pass)	-1 (time out)
125	19	302	1 (pass)	-1 (time out)
126	19	306	1 (pass)	-1 (time out)
127	19	307	1 (pass)	-1 (time out)
128	19	308	1 (pass)	-1 (time out)
129	19	924	1 (pass)	-1 (time out)
130	19	936	1 (pass)	-1 (time out)
131	19	1052	1 (pass)	-1 (time out)
132	19	1055	1 (pass)	-1 (time out)
133	19	1067	1 (pass)	-1 (time out)
134	19	1069	1 (pass)	-1 (time out)
135	19	1070	1 (pass)	-1 (time out)
136	19	1071	1 (pass)	-1 (time out)
137	21	375	1 (pass)	-1 (time out)
138	21	380	1 (pass)	-1 (time out)
139	21	381	1 (pass)	-1 (time out)
140	21	385	1 (pass)	-1 (time out)
141	21	387	1 (pass)	-1 (time out)
142	21	415	1 (pass)	-1 (time out)
143	21	416	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
144	21	423	1 (pass)	-1 (time out)
145	21	424	1 (pass)	-1 (time out)
146	21	427	1 (pass)	-1 (time out)
147	21	430	1 (pass)	-1 (time out)
148	21	431	1 (pass)	-1 (time out)
149	21	435	1 (pass)	-1 (time out)
150	21	436	1 (pass)	-1 (time out)
151	21	437	1 (pass)	-1 (time out)
152	21	441	1 (pass)	-1 (time out)
153	21	442	1 (pass)	-1 (time out)
154	21	447	1 (pass)	-1 (time out)
155	21	448	1 (pass)	-1 (time out)
156	21	449	1 (pass)	-1 (time out)
157	21	454	1 (pass)	-1 (time out)
158	21	456	1 (pass)	-1 (time out)
159	21	457	1 (pass)	-1 (time out)
160	21	458	1 (pass)	-1 (time out)
161	21	518	1 (pass)	-1 (time out)
162	21	520	1 (pass)	-1 (time out)
163	21	533	1 (pass)	-1 (time out)
164	21	535	1 (pass)	-1 (time out)
165	21	550	1 (pass)	-1 (time out)
166	21	552	1 (pass)	-1 (time out)
167	21	603	1 (pass)	-1 (time out)
168	21	604	1 (pass)	-1 (time out)
169	21	622	1 (pass)	-1 (time out)
170	21	624	1 (pass)	-1 (time out)
171	21	633	1 (pass)	-1 (time out)
172	21	635	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
173	21	645	1 (pass)	-1 (time out)
174	21	647	1 (pass)	-1 (time out)
175	21	807	1 (pass)	-1 (time out)
176	21	808	1 (pass)	-1 (time out)
177	21	816	1 (pass)	-1 (time out)
178	21	817	1 (pass)	-1 (time out)
179	21	820	1 (pass)	-1 (time out)
180	21	821	1 (pass)	-1 (time out)
181	21	1010	1 (pass)	0 (not solved)
182	21	1119	1 (pass)	-1 (time out)
183	21	1121	1 (pass)	-1 (time out)
184	21	1127	1 (pass)	-1 (time out)
185	21	1129	1 (pass)	-1 (time out)
186	21	1134	1 (pass)	-1 (time out)
187	21	1136	1 (pass)	-1 (time out)
188	23	7	1 (pass)	-1 (time out)
189	23	15	1 (pass)	-1 (time out)
190	23	39	1 (pass)	-1 (time out)
191	23	46	1 (pass)	-1 (time out)
192	24	47	1 (pass)	-1 (time out)
193	24	48	1 (pass)	-1 (time out)
194	24	49	1 (pass)	-1 (time out)
195	24	50	1 (pass)	-1 (time out)
196	24	51	1 (pass)	-1 (time out)
197	24	57	1 (pass)	-1 (time out)
198	24	148	1 (pass)	-1 (time out)
199	24	149	1 (pass)	-1 (time out)
200	24	150	1 (pass)	-1 (time out)
201	24	160	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
202	24	161	1 (pass)	-1 (time out)
203	24	162	1 (pass)	-1 (time out)
204	24	163	1 (pass)	-1 (time out)
205	24	164	1 (pass)	-1 (time out)
206	24	165	1 (pass)	-1 (time out)
207	24	166	1 (pass)	-1 (time out)
208	24	172	1 (pass)	-1 (time out)
209	24	173	1 (pass)	-1 (time out)
210	24	174	1 (pass)	-1 (time out)
211	25	590	1 (pass)	-1 (time out)
212	25	598	1 (pass)	-1 (time out)
213	25	738	1 (pass)	-1 (time out)
214	25	745	1 (pass)	-1 (time out)
215	25	1483	1 (pass)	-1 (time out)
216	25	1484	1 (pass)	-1 (time out)
217	25	1485	1 (pass)	-1 (time out)
218	25	1486	1 (pass)	-1 (time out)
219	25	1487	1 (pass)	-1 (time out)
220	25	1673	1 (pass)	-1 (time out)
221	25	1679	1 (pass)	-1 (time out)
222	25	1680	1 (pass)	-1 (time out)
223	25	1682	1 (pass)	-1 (time out)
224	25	1686	1 (pass)	-1 (time out)
225	25	1687	1 (pass)	-1 (time out)
226	25	2266	1 (pass)	-1 (time out)
227	25	2276	1 (pass)	-1 (time out)
228	25	2546	1 (pass)	-1 (time out)
229	25	2556	1 (pass)	-1 (time out)
230	25	2557	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
231	25	2558	1 (pass)	-1 (time out)
232	25	2559	1 (pass)	-1 (time out)
233	25	2562	1 (pass)	-1 (time out)
234	25	2563	1 (pass)	-1 (time out)
235	25	2566	1 (pass)	-1 (time out)
236	25	2567	1 (pass)	-1 (time out)
237	25	2568	1 (pass)	-1 (time out)
238	25	2569	1 (pass)	-1 (time out)
239	25	2570	1 (pass)	-1 (time out)
240	25	2571	1 (pass)	-1 (time out)
241	25	2572	1 (pass)	-1 (time out)
242	25	2573	1 (pass)	-1 (time out)
243	25	2576	1 (pass)	-1 (time out)
244	25	2584	1 (pass)	-1 (time out)
245	25	2585	1 (pass)	-1 (time out)
246	25	2586	1 (pass)	-1 (time out)
247	25	2587	1 (pass)	-1 (time out)
248	25	2588	1 (pass)	-1 (time out)
249	25	2589	1 (pass)	-1 (time out)
250	25	2590	1 (pass)	-1 (time out)
251	25	2591	1 (pass)	-1 (time out)
252	25	2605	1 (pass)	-1 (time out)
253	25	2614	1 (pass)	-1 (time out)
254	25	2623	1 (pass)	-1 (time out)
255	25	2624	1 (pass)	-2 (exception) `Exception raised: HeuristicGCDFailed`
256	25	2630	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
257	25	2639	1 (pass)	-1 (time out)
258	25	2643	1 (pass)	-1 (time out)
259	25	2667	1 (pass)	-1 (time out)
260	25	2725	1 (pass)	-1 (time out)
261	25	2740	1 (pass)	-1 (time out)
262	25	2798	1 (pass)	-1 (time out)
263	25	2799	1 (pass)	-1 (time out)
264	25	2800	1 (pass)	-1 (time out)
265	25	2801	1 (pass)	-1 (time out)
266	25	2851	1 (pass)	-1 (time out)
267	25	3017	1 (pass)	-1 (time out)
268	25	3020	1 (pass)	-1 (time out)
269	25	3077	1 (pass)	-1 (time out)
270	25	3078	1 (pass)	-1 (time out)
271	26	31	1 (pass)	-1 (time out)
272	26	61	1 (pass)	-1 (time out)
273	26	134	1 (pass)	-1 (time out)
274	26	139	1 (pass)	-1 (time out)
275	26	291	1 (pass)	-1 (time out)
276	26	292	1 (pass)	-1 (time out)
277	27	128	1 (pass)	-1 (time out)
278	27	155	1 (pass)	-1 (time out)
279	27	162	1 (pass)	-1 (time out)
280	27	164	1 (pass)	-1 (time out)
281	27	165	1 (pass)	-1 (time out)
282	27	166	1 (pass)	-1 (time out)
283	27	167	1 (pass)	-1 (time out)
284	27	168	1 (pass)	-1 (time out)
285	27	248	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
286	27	249	1 (pass)	-1 (time out)
287	27	252	1 (pass)	-1 (time out)
288	27	253	1 (pass)	-1 (time out)
289	27	254	1 (pass)	-1 (time out)
290	27	257	1 (pass)	-1 (time out)
291	27	258	1 (pass)	-1 (time out)
292	27	295	1 (pass)	-1 (time out)
293	27	536	1 (pass)	-1 (time out)
294	27	553	1 (pass)	-1 (time out)
295	27	557	1 (pass)	-1 (time out)
296	27	558	1 (pass)	-1 (time out)
297	27	562	1 (pass)	-1 (time out)
298	27	946	1 (pass)	-1 (time out)
299	27	1045	1 (pass)	-1 (time out)
300	27	1046	1 (pass)	-2 (exception) `Exception raised: HeuristicGCDFailed`
301	27	1064	1 (pass)	-1 (time out)
302	28	1	1 (pass)	-1 (time out)
303	28	2	1 (pass)	-1 (time out)
304	28	9	1 (pass)	-1 (time out)
305	28	10	1 (pass)	-1 (time out)
306	28	17	1 (pass)	-1 (time out)
307	28	18	1 (pass)	-1 (time out)
308	29	3	1 (pass)	-1 (time out)
309	29	5	1 (pass)	-1 (time out)
310	29	6	1 (pass)	-1 (time out)
311	29	65	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
312	29	68	1 (pass)	-1 (time out)
313	29	69	1 (pass)	-1 (time out)
314	29	586	1 (pass)	-1 (time out)
315	30	336	1 (pass)	-1 (time out)
316	33	370	1 (pass)	-1 (time out)
317	33	371	1 (pass)	-1 (time out)
318	33	372	1 (pass)	-1 (time out)
319	33	440	1 (pass)	-1 (time out)
320	33	656	1 (pass)	-1 (time out)
321	33	721	1 (pass)	-1 (time out)
322	33	1281	1 (pass)	-1 (time out)
323	33	1315	1 (pass)	-1 (time out)
324	33	1438	1 (pass)	-1 (time out)
325	33	1646	1 (pass)	-1 (time out)
326	33	1647	1 (pass)	-1 (time out)
327	33	1648	1 (pass)	-1 (time out)
328	33	1659	1 (pass)	-1 (time out)
329	33	1671	1 (pass)	-1 (time out)
330	33	1731	1 (pass)	-1 (time out)
331	33	1993	1 (pass)	-1 (time out)
332	33	1996	1 (pass)	-1 (time out)
333	33	2001	1 (pass)	-1 (time out)
334	33	2288	1 (pass)	-1 (time out)
335	33	2316	1 (pass)	-1 (time out)
336	33	2317	1 (pass)	-1 (time out)
337	33	2325	1 (pass)	-1 (time out)
338	33	2549	1 (pass)	-1 (time out)
339	33	2550	1 (pass)	-1 (time out)
340	34	178	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
341	34	184	1 (pass)	-1 (time out)
342	34	190	1 (pass)	-1 (time out)
343	34	192	1 (pass)	-1 (time out)
344	34	419	1 (pass)	-1 (time out)
345	34	466	1 (pass)	-1 (time out)
346	34	478	1 (pass)	-1 (time out)
347	34	479	1 (pass)	-1 (time out)
348	34	482	1 (pass)	-1 (time out)
349	34	483	1 (pass)	-1 (time out)
350	34	778	1 (pass)	-1 (time out)
351	34	779	1 (pass)	-1 (time out)
352	34	841	1 (pass)	-1 (time out)
353	34	842	1 (pass)	-1 (time out)
354	34	1009	1 (pass)	-1 (time out)
355	34	1010	1 (pass)	-1 (time out)
356	34	1013	1 (pass)	-1 (time out)
357	34	1114	1 (pass)	-1 (time out)
358	34	1127	1 (pass)	-1 (time out)
359	34	1229	1 (pass)	-1 (time out)
360	34	1241	1 (pass)	-1 (time out)
361	34	1251	1 (pass)	-1 (time out)
362	34	1444	1 (pass)	-1 (time out)
363	34	1447	1 (pass)	-1 (time out)
364	34	1448	1 (pass)	-1 (time out)
365	34	1487	1 (pass)	-1 (time out)
366	34	1488	1 (pass)	-1 (time out)
367	34	1610	1 (pass)	-1 (time out)
368	34	1611	1 (pass)	-1 (time out)
369	34	1612	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
370	34	1654	1 (pass)	-1 (time out)
371	34	1655	1 (pass)	-1 (time out)
372	34	1804	1 (pass)	-1 (time out)
373	34	1805	1 (pass)	-1 (time out)
374	34	1806	1 (pass)	-1 (time out)
375	34	1807	1 (pass)	-1 (time out)
376	34	1810	1 (pass)	-1 (time out)
377	34	1820	1 (pass)	-1 (time out)
378	34	1884	1 (pass)	-1 (time out)
379	34	2065	1 (pass)	-1 (time out)
380	34	2066	1 (pass)	-1 (time out)
381	34	2067	1 (pass)	-1 (time out)
382	34	2068	1 (pass)	-1 (time out)
383	34	2078	1 (pass)	-1 (time out)
384	34	2146	1 (pass)	-1 (time out)
385	34	2147	1 (pass)	-1 (time out)
386	34	2570	1 (pass)	-1 (time out)
387	34	2640	1 (pass)	-1 (time out)
388	34	2641	1 (pass)	-1 (time out)
389	35	359	1 (pass)	-1 (time out)
390	35	360	1 (pass)	-1 (time out)
391	35	361	1 (pass)	-1 (time out)
392	35	430	1 (pass)	-1 (time out)
393	35	589	1 (pass)	-1 (time out)
394	35	805	1 (pass)	-1 (time out)
395	35	925	1 (pass)	-1 (time out)
396	35	926	1 (pass)	-1 (time out)
397	38	367	1 (pass)	-1 (time out)
398	38	368	1 (pass)	-1 (time out)

Continued on next page

Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
399	38	369	1 (pass)	-1 (time out)
400	39	317	1 (pass)	-1 (time out)
401	39	326	1 (pass)	-1 (time out)
402	40	284	1 (pass)	-1 (time out)
403	41	55	1 (pass)	-1 (time out)
404	41	65	1 (pass)	-1 (time out)
405	43	37	1 (pass)	-1 (time out)
406	43	38	1 (pass)	-1 (time out)
407	43	131	1 (pass)	-1 (time out)
408	43	132	1 (pass)	-1 (time out)
409	46	565	1 (pass)	-1 (time out)
410	46	597	1 (pass)	-1 (time out)
411	47	50	1 (pass)	-1 (time out)
412	47	61	1 (pass)	-1 (time out)
413	47	62	1 (pass)	-1 (time out)
414	48	41	1 (pass)	-1 (time out)
415	48	130	1 (pass)	-1 (time out)
416	48	134	1 (pass)	-1 (time out)
417	51	209	1 (pass)	-1 (time out)
418	51	217	1 (pass)	-1 (time out)
419	51	255	1 (pass)	-1 (time out)
420	52	178	1 (pass)	-1 (time out)
421	52	179	1 (pass)	-1 (time out)
422	52	182	1 (pass)	-1 (time out)
423	52	183	1 (pass)	-1 (time out)
424	52	184	1 (pass)	-1 (time out)
425	52	185	1 (pass)	-1 (time out)
426	52	249	1 (pass)	-1 (time out)
427	52	420	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
428	52	445	1 (pass)	-1 (time out)
429	52	486	1 (pass)	-1 (time out)
430	52	553	1 (pass)	-1 (time out)
431	52	554	1 (pass)	-1 (time out)
432	52	555	1 (pass)	-1 (time out)
433	52	624	1 (pass)	-1 (time out)
434	52	675	1 (pass)	-1 (time out)
435	52	690	1 (pass)	-1 (time out)
436	52	1015	1 (pass)	-1 (time out)
437	53	31	1 (pass)	-1 (time out)
438	53	37	1 (pass)	-1 (time out)
439	55	13	1 (pass)	-1 (time out)
440	55	16	1 (pass)	-1 (time out)
441	55	183	1 (pass)	-1 (time out)
442	55	184	1 (pass)	-1 (time out)
443	55	189	1 (pass)	-1 (time out)
444	55	190	1 (pass)	-1 (time out)
445	55	191	1 (pass)	-1 (time out)
446	55	193	1 (pass)	-1 (time out)
447	55	588	1 (pass)	-1 (time out)
448	55	592	1 (pass)	-1 (time out)
449	55	596	1 (pass)	-1 (time out)
450	56	89	1 (pass)	-1 (time out)
451	56	95	1 (pass)	-1 (time out)
452	56	146	1 (pass)	-1 (time out)
453	57	62	1 (pass)	-1 (time out)
454	57	63	1 (pass)	-1 (time out)
455	57	64	1 (pass)	-1 (time out)
456	57	65	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
457	57	66	1 (pass)	-1 (time out)
458	57	67	1 (pass)	-1 (time out)
459	57	68	1 (pass)	-1 (time out)
460	57	69	1 (pass)	-1 (time out)
461	57	70	1 (pass)	-1 (time out)
462	57	71	1 (pass)	-1 (time out)
463	57	72	1 (pass)	-1 (time out)
464	57	73	1 (pass)	-1 (time out)
465	57	144	1 (pass)	-1 (time out)
466	57	145	1 (pass)	-1 (time out)
467	57	146	1 (pass)	-1 (time out)
468	57	225	1 (pass)	-1 (time out)
469	57	232	1 (pass)	-1 (time out)
470	57	233	1 (pass)	-1 (time out)
471	57	234	1 (pass)	-1 (time out)
472	57	318	1 (pass)	-1 (time out)
473	57	352	1 (pass)	-1 (time out)
474	57	353	1 (pass)	-1 (time out)
475	57	361	1 (pass)	-1 (time out)
476	57	379	1 (pass)	-1 (time out)
477	57	408	1 (pass)	-1 (time out)
478	57	415	1 (pass)	-1 (time out)
479	57	424	1 (pass)	-1 (time out)
480	57	425	1 (pass)	-1 (time out)
481	57	441	1 (pass)	-1 (time out)
482	58	5	1 (pass)	-1 (time out)
483	58	208	1 (pass)	-1 (time out)
484	61	9	1 (pass)	-1 (time out)
485	61	48	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
486	62	143	1 (pass)	-1 (time out)
487	63	11	1 (pass)	-1 (time out)
488	63	20	1 (pass)	-1 (time out)
489	63	52	1 (pass)	-1 (time out)
490	63	60	1 (pass)	-1 (time out)
491	63	192	1 (pass)	-1 (time out)
492	63	268	1 (pass)	-1 (time out)
493	63	289	1 (pass)	-1 (time out)
494	63	315	1 (pass)	-1 (time out)
495	63	322	1 (pass)	-1 (time out)
496	63	332	1 (pass)	-1 (time out)
497	63	335	1 (pass)	-1 (time out)
498	63	336	1 (pass)	-1 (time out)
499	63	406	1 (pass)	-1 (time out)
500	63	426	1 (pass)	-1 (time out)
501	63	447	1 (pass)	-1 (time out)
502	63	465	1 (pass)	-1 (time out)
503	63	494	1 (pass)	-1 (time out)
504	63	630	1 (pass)	-1 (time out)
505	64	18	1 (pass)	-1 (time out)
506	64	20	1 (pass)	-1 (time out)
507	64	38	1 (pass)	-1 (time out)
508	64	77	1 (pass)	-1 (time out)
509	65	192	1 (pass)	-1 (time out)
510	65	208	1 (pass)	-1 (time out)
511	65	255	1 (pass)	-1 (time out)
512	66	227	1 (pass)	-1 (time out)
513	66	301	1 (pass)	-1 (time out)
514	69	145	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
515	69	146	1 (pass)	-1 (time out)
516	70	75	1 (pass)	-1 (time out)
517	70	92	1 (pass)	-1 (time out)
518	70	94	1 (pass)	-1 (time out)
519	70	129	1 (pass)	-1 (time out)
520	70	131	1 (pass)	-1 (time out)
521	70	433	1 (pass)	-1 (time out)
522	70	495	1 (pass)	-1 (time out)
523	70	496	1 (pass)	-1 (time out)
524	70	632	1 (pass)	-1 (time out)
525	73	178	1 (pass)	-1 (time out)
526	73	260	1 (pass)	-1 (time out)
527	73	439	1 (pass)	-1 (time out)
528	73	458	1 (pass)	-1 (time out)
529	73	461	1 (pass)	-1 (time out)
530	73	470	1 (pass)	-1 (time out)
531	73	471	1 (pass)	-1 (time out)
532	73	682	1 (pass)	-1 (time out)
533	73	700	1 (pass)	-1 (time out)
534	74	420	1 (pass)	-1 (time out)
535	74	440	1 (pass)	-1 (time out)
536	74	554	1 (pass)	-1 (time out)
537	74	565	1 (pass)	-1 (time out)
538	74	566	1 (pass)	-1 (time out)
539	74	567	1 (pass)	-1 (time out)
540	74	624	1 (pass)	-1 (time out)
541	74	634	1 (pass)	-1 (time out)
542	74	644	1 (pass)	-1 (time out)
543	74	645	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
544	74	678	1 (pass)	-1 (time out)
545	74	679	1 (pass)	-1 (time out)
546	74	697	1 (pass)	-1 (time out)
547	74	698	1 (pass)	-1 (time out)
548	74	699	1 (pass)	-1 (time out)
549	74	706	1 (pass)	-1 (time out)
550	74	707	1 (pass)	-1 (time out)
551	74	725	1 (pass)	-1 (time out)
552	74	741	1 (pass)	-1 (time out)
553	74	1021	1 (pass)	-1 (time out)
554	74	1235	1 (pass)	-1 (time out)
555	76	37	1 (pass)	-1 (time out)
556	76	49	1 (pass)	-1 (time out)
557	76	50	1 (pass)	-1 (time out)
558	76	51	1 (pass)	-1 (time out)
559	76	80	1 (pass)	-1 (time out)
560	76	218	1 (pass)	-1 (time out)
561	76	219	1 (pass)	-1 (time out)
562	76	220	1 (pass)	-1 (time out)
563	76	221	1 (pass)	-1 (time out)
564	76	248	1 (pass)	-1 (time out)
565	76	265	1 (pass)	-1 (time out)
566	76	272	1 (pass)	-1 (time out)
567	79	81	1 (pass)	-1 (time out)
568	79	89	1 (pass)	-1 (time out)
569	79	396	1 (pass)	-1 (time out)
570	82	142	1 (pass)	-1 (time out)
571	82	153	1 (pass)	-1 (time out)
572	82	175	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
573	86	25	1 (pass)	-1 (time out)
574	89	792	1 (pass)	-1 (time out)
575	89	852	1 (pass)	-1 (time out)
576	89	853	1 (pass)	-1 (time out)
577	89	867	1 (pass)	-1 (time out)
578	89	875	1 (pass)	-1 (time out)
579	92	292	1 (pass)	-1 (time out)
580	93	91	1 (pass)	-1 (time out)
581	93	92	1 (pass)	-1 (time out)
582	93	118	1 (pass)	-1 (time out)
583	93	290	1 (pass)	-1 (time out)
584	93	291	1 (pass)	-1 (time out)
585	93	317	1 (pass)	-1 (time out)
586	94	595	1 (pass)	-1 (time out)
587	95	31	1 (pass)	-1 (time out)
588	98	304	1 (pass)	-1 (time out)
589	98	321	1 (pass)	-1 (time out)
590	98	326	1 (pass)	-1 (time out)
591	98	330	1 (pass)	-1 (time out)
592	98	332	1 (pass)	-1 (time out)
593	101	486	1 (pass)	0 (not solved)
594	101	487	1 (pass)	0 (not solved)
595	103	28	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
596	103	29	1 (pass)	-2 (exception) `Exception raised: NotInvertible`

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
597	103	38	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
598	103	40	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
599	103	1094	1 (pass)	-1 (time out)
600	103	1099	1 (pass)	-1 (time out)
601	104	12	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
602	104	13	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
603	104	30	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
604	104	31	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
605	105	62	1 (pass)	-1 (time out)
606	105	68	1 (pass)	-1 (time out)
607	105	74	1 (pass)	-1 (time out)
608	105	77	1 (pass)	-1 (time out)
609	105	78	1 (pass)	-1 (time out)
610	106	227	1 (pass)	-1 (time out)
611	106	228	1 (pass)	-1 (time out)
612	106	234	1 (pass)	-1 (time out)
613	115	148	1 (pass)	-1 (time out)
614	115	167	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
615	115	180	1 (pass)	-1 (time out)
616	115	182	1 (pass)	-1 (time out)
617	126	363	1 (pass)	-1 (time out)
618	126	364	1 (pass)	-1 (time out)
619	126	365	1 (pass)	-1 (time out)
620	135	1	1 (pass)	-1 (time out)
621	135	2	1 (pass)	-1 (time out)
622	135	13	1 (pass)	-1 (time out)
623	135	23	1 (pass)	-1 (time out)
624	135	24	1 (pass)	-1 (time out)
625	135	39	1 (pass)	-1 (time out)
626	135	52	1 (pass)	-1 (time out)
627	135	129	1 (pass)	-1 (time out)
628	135	130	1 (pass)	-1 (time out)
629	135	141	1 (pass)	-1 (time out)
630	135	151	1 (pass)	-1 (time out)
631	135	152	1 (pass)	-1 (time out)
632	135	190	1 (pass)	-1 (time out)
633	135	208	1 (pass)	-1 (time out)
634	135	226	1 (pass)	-1 (time out)
635	135	246	1 (pass)	-1 (time out)
636	136	9	1 (pass)	-1 (time out)
637	136	113	1 (pass)	-1 (time out)
638	136	275	1 (pass)	-1 (time out)
639	137	52	1 (pass)	-1 (time out)
640	137	57	1 (pass)	-1 (time out)
641	139	23	1 (pass)	-1 (time out)
642	139	24	1 (pass)	-1 (time out)
643	139	223	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
644	139	225	1 (pass)	-1 (time out)
645	140	43	1 (pass)	-1 (time out)
646	140	45	1 (pass)	-1 (time out)
647	140	46	1 (pass)	-1 (time out)
648	141	211	1 (pass)	-1 (time out)
649	141	479	1 (pass)	-1 (time out)
650	141	480	1 (pass)	-1 (time out)
651	141	704	1 (pass)	-1 (time out)
652	141	893	1 (pass)	-1 (time out)
653	141	942	1 (pass)	-1 (time out)
654	144	463	1 (pass)	-1 (time out)
655	148	96	1 (pass)	-1 (time out)
656	148	103	1 (pass)	-1 (time out)
657	148	113	1 (pass)	-1 (time out)
658	150	42	1 (pass)	-1 (time out)
659	150	125	1 (pass)	-1 (time out)
660	150	477	1 (pass)	0 (not solved)
661	150	546	1 (pass)	0 (not solved)
662	150	622	1 (pass)	0 (not solved)
663	150	859	1 (pass)	0 (not solved)
664	150	928	1 (pass)	0 (not solved)
665	150	986	1 (pass)	0 (not solved)
666	150	1056	1 (pass)	0 (not solved)
667	150	1159	1 (pass)	-1 (time out)
668	152	248	1 (pass)	0 (not solved)
669	152	249	1 (pass)	0 (not solved)
670	152	250	1 (pass)	0 (not solved)
671	152	251	1 (pass)	0 (not solved)
672	152	252	1 (pass)	0 (not solved)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
673	152	263	1 (pass)	0 (not solved)
674	152	264	1 (pass)	0 (not solved)
675	152	265	1 (pass)	0 (not solved)
676	152	266	1 (pass)	0 (not solved)
677	152	277	1 (pass)	0 (not solved)
678	152	278	1 (pass)	0 (not solved)
679	152	279	1 (pass)	-1 (time out)
680	152	291	1 (pass)	0 (not solved)
681	152	292	1 (pass)	0 (not solved)
682	152	343	1 (pass)	0 (not solved)
683	153	127	1 (pass)	-1 (time out)
684	153	132	1 (pass)	-1 (time out)
685	160	231	1 (pass)	-1 (time out)
686	163	74	1 (pass)	-1 (time out)
687	163	92	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
688	163	93	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
689	163	94	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
690	163	95	1 (pass)	-2 (exception) `Exception raised: NotInvertible`
691	164	34	1 (pass)	-1 (time out)
692	164	35	1 (pass)	-1 (time out)
693	164	182	1 (pass)	-1 (time out)

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#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
694	164	183	1 (pass)	-1 (time out)
695	164	207	1 (pass)	-1 (time out)
696	170	26	1 (pass)	-1 (time out)
697	172	63	1 (pass)	-1 (time out)
698	173	207	1 (pass)	0 (not solved)
699	175	33	1 (pass)	-1 (time out)
700	176	1	1 (pass)	-1 (time out)
701	179	31	1 (pass)	-1 (time out)
702	179	157	1 (pass)	-1 (time out)
703	185	172	1 (pass)	-1 (time out)
704	185	178	1 (pass)	-1 (time out)
705	185	187	1 (pass)	-1 (time out)
706	185	689	1 (pass)	-1 (time out)
707	185	692	1 (pass)	-1 (time out)
708	185	706	1 (pass)	-1 (time out)
709	185	810	1 (pass)	-1 (time out)
710	185	913	1 (pass)	-1 (time out)
711	185	931	1 (pass)	-1 (time out)
712	185	952	1 (pass)	-1 (time out)
713	185	959	1 (pass)	-1 (time out)
714	185	960	1 (pass)	-1 (time out)
715	187	63	1 (pass)	-1 (time out)
716	187	64	1 (pass)	-1 (time out)
717	187	72	1 (pass)	-1 (time out)
718	187	73	1 (pass)	-1 (time out)
719	187	74	1 (pass)	-1 (time out)
720	187	252	1 (pass)	-1 (time out)
721	192	194	1 (pass)	-1 (time out)
722	195	37	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
723	196	444	1 (pass)	0 (not solved)
724	196	445	1 (pass)	0 (not solved)
725	196	446	1 (pass)	-1 (time out)
726	196	1315	1 (pass)	0 (not solved)
727	197	89	1 (pass)	-2 (exception) `Exception raised: TypeError`
728	197	97	1 (pass)	-2 (exception) `Exception raised: TypeError`
729	197	98	1 (pass)	-2 (exception) `Exception raised: TypeError`
730	197	105	1 (pass)	-2 (exception) `Exception raised: TypeError`
731	197	106	1 (pass)	-2 (exception) `Exception raised: TypeError`
732	197	107	1 (pass)	-2 (exception) `Exception raised: TypeError`
733	197	130	1 (pass)	-1 (time out)
734	197	131	1 (pass)	-1 (time out)
735	197	132	1 (pass)	-1 (time out)
736	197	133	1 (pass)	-1 (time out)
737	197	144	1 (pass)	-2 (exception) `Exception raised: TypeError`

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
738	197	152	1 (pass)	-2 (exception) `Exception raised: TypeError`
739	197	153	1 (pass)	-2 (exception) `Exception raised: TypeError`
740	197	159	1 (pass)	-2 (exception) `Exception raised: TypeError`
741	197	160	1 (pass)	-2 (exception) `Exception raised: TypeError`
742	197	161	1 (pass)	-2 (exception) `Exception raised: TypeError`
743	197	162	1 (pass)	-2 (exception) `Exception raised: TypeError`
744	197	168	1 (pass)	-1 (time out)
745	197	176	1 (pass)	-1 (time out)
746	197	184	1 (pass)	-1 (time out)
747	198	108	1 (pass)	-1 (time out)
748	198	162	1 (pass)	-2 (exception) `Exception raised: TypeError`
749	198	170	1 (pass)	-2 (exception) `Exception raised: TypeError`

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
750	198	171	1 (pass)	-2 (exception) `Exception raised: TypeError`
751	198	178	1 (pass)	-2 (exception) `Exception raised: TypeError`
752	198	179	1 (pass)	-2 (exception) `Exception raised: TypeError`
753	198	180	1 (pass)	-2 (exception) `Exception raised: TypeError`
754	199	246	1 (pass)	-1 (time out)
755	199	321	1 (pass)	-1 (time out)
756	199	333	1 (pass)	0 (not solved)
757	199	334	1 (pass)	0 (not solved)
758	199	336	1 (pass)	-1 (time out)
759	199	369	1 (pass)	0 (not solved)
760	199	370	1 (pass)	0 (not solved)
761	199	371	1 (pass)	-1 (time out)
762	199	740	1 (pass)	0 (not solved)
763	201	80	1 (pass)	0 (not solved)
764	204	4	1 (pass)	-2 (exception) `Exception raised: AttributeError`
765	204	64	1 (pass)	-1 (time out)
766	204	67	1 (pass)	-2 (exception) `Exception raised: AttributeError`

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
767	204	68	1 (pass)	-2 (exception) `Exception raised: AttributeError`
768	204	71	1 (pass)	-2 (exception) `Exception raised: AttributeError`
769	204	72	1 (pass)	-2 (exception) `Exception raised: AttributeError`
770	204	73	1 (pass)	-2 (exception) `Exception raised: AttributeError`
771	204	74	1 (pass)	-1 (time out)
772	204	107	1 (pass)	-2 (exception) `Exception raised: AttributeError`
773	204	167	1 (pass)	-1 (time out)
774	204	170	1 (pass)	-2 (exception) `Exception raised: AttributeError`
775	204	171	1 (pass)	-2 (exception) `Exception raised: AttributeError`
776	204	174	1 (pass)	-2 (exception) `Exception raised: AttributeError`
777	204	175	1 (pass)	-2 (exception) `Exception raised: AttributeError`

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
778	204	176	1 (pass)	-2 (exception) `Exception raised: AttributeError`
779	204	177	1 (pass)	-1 (time out)
780	204	210	1 (pass)	-2 (exception) `Exception raised: AttributeError`
781	204	270	1 (pass)	-1 (time out)
782	204	273	1 (pass)	-2 (exception) `Exception raised: AttributeError`
783	204	274	1 (pass)	-2 (exception) `Exception raised: AttributeError`
784	204	275	1 (pass)	-2 (exception) `Exception raised: AttributeError`
785	204	278	1 (pass)	-2 (exception) `Exception raised: AttributeError`
786	204	279	1 (pass)	-2 (exception) `Exception raised: AttributeError`
787	204	280	1 (pass)	-2 (exception) `Exception raised: AttributeError`
788	204	281	1 (pass)	-2 (exception) `Exception raised: AttributeError`
789	204	282	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
790	205	9	1 (pass)	-2 (exception) `Exception raised: AttributeError`
791	205	71	1 (pass)	-1 (time out)
792	205	118	1 (pass)	-2 (exception) `Exception raised: AttributeError`
793	205	180	1 (pass)	-1 (time out)
794	206	6	1 (pass)	-2 (exception) `Exception raised: AttributeError`
795	206	74	1 (pass)	-2 (exception) `Exception raised: AttributeError`
796	207	6	1 (pass)	-2 (exception) `Exception raised: AttributeError`
797	207	74	1 (pass)	-2 (exception) `Exception raised: AttributeError`
798	208	31	1 (pass)	-1 (time out)
799	209	491	1 (pass)	-1 (time out)
800	209	533	1 (pass)	-1 (time out)
801	209	555	1 (pass)	-1 (time out)
802	209	1123	1 (pass)	-2 (exception) `Exception raised: SympifyError`
803	209	1373	1 (pass)	-1 (time out)
804	209	1374	1 (pass)	-1 (time out)
805	209	1473	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
806	209	2027	1 (pass)	-2 (exception) `Exception raised: SympifyError`
807	209	2178	1 (pass)	-2 (exception) `Exception raised: SympifyError`
808	209	2179	1 (pass)	-2 (exception) `Exception raised: SympifyError`
809	210	327	1 (pass)	-1 (time out)
810	210	355	1 (pass)	-2 (exception) `Exception raised: CoercionFailed`
811	210	369	1 (pass)	-1 (time out)
812	210	434	1 (pass)	-1 (time out)
813	210	893	1 (pass)	-1 (time out)
814	210	1056	1 (pass)	-1 (time out)
815	210	1394	1 (pass)	-1 (time out)
816	210	1777	1 (pass)	-1 (time out)
817	210	1847	1 (pass)	-1 (time out)
818	210	2047	1 (pass)	-1 (time out)
819	210	2096	1 (pass)	-2 (exception) `Exception raised: CoercionFailed`
820	210	2165	1 (pass)	-1 (time out)
821	210	2406	1 (pass)	-1 (time out)
822	210	2485	1 (pass)	-1 (time out)
823	210	2524	1 (pass)	-1 (time out)
824	210	2856	1 (pass)	-1 (time out)
825	210	3015	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
826	210	3068	1 (pass)	-1 (time out)
827	210	3362	1 (pass)	-1 (time out)
828	210	3434	1 (pass)	-1 (time out)
829	210	3539	1 (pass)	-1 (time out)
830	210	3683	1 (pass)	-1 (time out)
831	210	3697	1 (pass)	-2 (exception) Exception raised: CoercionFailed
832	210	4243	1 (pass)	-1 (time out)
833	210	4408	1 (pass)	-1 (time out)
834	210	4741	1 (pass)	-1 (time out)
835	210	4810	1 (pass)	-1 (time out)
836	210	4950	1 (pass)	-1 (time out)
837	210	5263	1 (pass)	-1 (time out)
838	210	5546	1 (pass)	-1 (time out)
839	210	5602	1 (pass)	-1 (time out)
840	210	5723	1 (pass)	-2 (exception) Exception raised: CoercionFailed
841	210	5812	1 (pass)	-1 (time out)
842	210	5926	1 (pass)	-1 (time out)
843	210	6723	1 (pass)	-1 (time out)
844	210	6731	1 (pass)	-1 (time out)
845	210	6748	1 (pass)	-1 (time out)
846	210	6870	1 (pass)	-2 (exception) Exception raised: CoercionFailed
847	210	6874	1 (pass)	-1 (time out)
848	210	6975	1 (pass)	-1 (time out)

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Table 1 – continued from previous page

#	test file #	integral #	Sympy 1.10.1 under Python 3.10.4	Sympy 1.8 under Python 3.8.8
849	210	7352	1 (pass)	-1 (time out)
850	210	7827	1 (pass)	0 (not solved)
851	210	7854	1 (pass)	-1 (time out)
852	210	8409	1 (pass)	-1 (time out)
853	210	8484	1 (pass)	-1 (time out)
854	210	8897	1 (pass)	-1 (time out)
855	210	9060	1 (pass)	-1 (time out)
856	210	9595	1 (pass)	-1 (time out)
857	210	9704	1 (pass)	-1 (time out)
858	210	9924	1 (pass)	-1 (time out)
859	210	10025	1 (pass)	-2 (exception) `Exception raised: CoercionFailed`
860	210	10117	1 (pass)	-1 (time out)
861	210	10291	1 (pass)	-1 (time out)

2 Test file number 1

Test folder name:

`test_cases/0_Independent_test_suites/1_Apostol_Problems`

2.1 Problem number 145

$$\int \frac{1}{b^2\cos^2(x) + a^2\sin^2(x)}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{a\tan(x)}{b}\right)}{ab}$$

command

`integrate(1/(b**2*cos(x)**2+a**2*sin(x)**2),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

2.2 Problem number 146

$$\int \frac{1}{(b\cos(x) + a\sin(x))^2}\,dx$$

Optimal antiderivative

$$\frac{\sin(x)}{b\,(b\cos(x) + a\sin(x))}$$

command

`integrate(1/(b*cos(x)+a*sin(x))**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}\tan\left(\frac{x}{2}\right)}{\tan^2\left(\frac{x}{2}\right)-1} \\ \frac{x\tan^4\left(\frac{x}{2}\right)}{2b^2\sin^2(x)\tan^4\left(\frac{x}{2}\right)-4b^2\sin^2(x)\tan^2\left(\frac{x}{2}\right)+2b^2\sin^2(x)+8b^2\sin(x)\cos(x)\tan^3\left(\frac{x}{2}\right)-8b^2\sin(x)\cos(x)\tan\left(\frac{x}{2}\right)+8b^2\cos^2(x)\tan^2\left(\frac{x}{2}\right)} + \frac{}{2b^2\sin} \\ \frac{\frac{\tan\left(\frac{x}{2}\right)}{2}-\frac{1}{2\tan\left(\frac{x}{2}\right)}}{a^2} \\ \frac{2\tan\left(\frac{x}{2}\right)}{2ab\tan\left(\frac{x}{2}\right)-b^2\tan^2\left(\frac{x}{2}\right)+b^2} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\int \frac{1}{\left(a\sin\left(x\right)+b\cos\left(x\right)\right)^{2}}\,dx$$

3 Test file number 5

Test folder name:

`test_cases/0_Independent_test_suites/5_Hearn_Problems`

3.1 Problem number 123

$$\int \frac{1}{a+\cos(x)+b\sin(x)}\,dx$$

Optimal antiderivative

$$-\frac{2\,\mathrm{arctanh}\left(\frac{b-(1-a)\tan\left(\frac{x}{2}\right)}{\sqrt{-a^{2}+b^{2}+1}}\right)}{\sqrt{-a^{2}+b^{2}+1}}$$

command

```
integrate(1/(a+cos(x)+b*sin(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

3.2 Problem number 237

$$\int \sqrt{1+\cos(x)}\,dx$$

Optimal antiderivative

$$\frac{2\sin\left(x\right)}{\sqrt{1+\cos\left(x\right)}}$$

command

```
integrate((1+cos(x))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$2\sqrt{1-\frac{\tan^2\left(\frac{x}{2}\right)}{\tan^2\left(\frac{x}{2}\right)+1}+\frac{1}{\tan^2\left(\frac{x}{2}\right)+1}}\tan\left(\frac{x}{2}\right)$$

Sympy 1.8 under Python 3.8.8 output

$$\int\sqrt{\cos(x)+1}\,dx$$

3.3 Problem number 275

$$\int e^{\frac{x}{2}+xz}x^4\sin^4(\pi z)\,dz$$

Optimal antiderivative

$$\frac{24\,\mathrm{e}^{\frac{1}{2}x+xz}\pi^4x^3}{64\pi^4+20\pi^2x^2+x^4}-\frac{24\,\mathrm{e}^{\frac{1}{2}x+xz}\pi^3x^4\cos(\pi z)\sin(\pi z)}{64\pi^4+20\pi^2x^2+x^4}+\frac{12\,\mathrm{e}^{\frac{1}{2}x+xz}\pi^2x^5\left(\sin^2(\pi z)\right)}{64\pi^4+20\pi^2x^2+x^4}-\frac{4\,\mathrm{e}^{\frac{1}{2}x+xz}\pi\,x^4\cos(\pi z)\left(\sin^3(\pi z)\right)}{16\pi^2+x^2}+\frac{\mathrm{e}^{\frac{1}{2}x+xz}x^5\left(\sin^4(\pi z)\right)}{16\pi^2+x^2}$$

command

```
integrate(x**4*exp(1/2*x+x*z)*sin(pi*z)**4,z)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

4 Test file number 8

Test folder name:

`test_cases/0_Independent_test_suites/8_Moses_Problems`

4.1 Problem number 70

$$\int\frac{(-A^2-B^2)\cos^2(z)}{B\left(1-\frac{(A^2+B^2)\sin^2(z)}{B^2}\right)}\,dz$$

Optimal antiderivative

$$-Bz-A\operatorname{arctanh}\left(\frac{A\tan(z)}{B}\right)$$

command

`integrate((-A**2-B**2)*cos(z)**2/B/(1-(A**2+B**2)*sin(z)**2/B**2),z)`

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\left(-A^2-B^2\right)\left(\begin{cases} z \\ \frac{z\sin^2(z)}{2}+\frac{z\cos^2(z)}{2}+\frac{\sin(z)\cos(z)}{2} \\ \frac{AB\log\left(-\frac{A}{B}+\tan\left(\frac{z}{2}\right)-\frac{\sqrt{A^2+B^2}}{B}\right)}{2A^2+2B^2}+\frac{AB\log\left(-\frac{A}{B}+\tan\left(\frac{z}{2}\right)+\frac{\sqrt{A^2+B^2}}{B}\right)}{2A^2+2B^2}-\frac{AB\log\left(\frac{A}{B}+\tan\left(\frac{z}{2}\right)-\frac{\sqrt{A^2+}}{B}\right.}{2A^2+2B^2}\end{cases}\right.}{B}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

5 Test file number 9

Test folder name:

`test_cases/0_Independent_test_suites/9_Stewart_Problems`

5.1 Problem number 251

$$\int \frac{1}{b^2\cos^2(x)+a^2\sin^2(x)}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{a\tan(x)}{b}\right)}{ab}$$

command

`integrate(1/(b**2*cos(x)**2+a**2*sin(x)**2),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

6 Test file number 10

Test folder name:

`test_cases/0_Independent_test_suites/10_Timofeev_Problems`

6.1 Problem number 86

$$\int \cos^{-1}\left(\sqrt{\frac{x}{1+x}}\right) dx$$

Optimal antiderivative

$$(1+x)\left(\arccos\left(\sqrt{\frac{x}{1+x}}\right)+\sqrt{\frac{1}{1+x}}\,\sqrt{\frac{x}{1+x}}\right)$$

command

`integrate(acos((x/(1+x))**(1/2)),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$x\operatorname{acos}\left(\sqrt{\frac{x}{x+1}}\right)-2\left(\begin{cases}-\frac{\sqrt{\frac{x}{x+1}}}{2\sqrt{-\frac{x}{x+1}+1}}+\frac{\operatorname{asin}\left(\sqrt{\frac{x}{x+1}}\right)}{2} & \text{for } \sqrt{\frac{x}{x+1}}>-1\wedge\sqrt{\frac{x}{x+1}}<1\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

$$\int \operatorname{acos}\left(\sqrt{\frac{x}{x+1}}\right) dx$$

6.2 Problem number 217

$$\int \frac{1}{(-1+x)^{2/3}x^5}\, dx$$

Optimal antiderivative

$$\frac{(-1+x)^{\frac{1}{3}}}{4x^4}+\frac{11(-1+x)^{\frac{1}{3}}}{36x^3}+\frac{11(-1+x)^{\frac{1}{3}}}{27x^2}+\frac{55(-1+x)^{\frac{1}{3}}}{81x}+\frac{55\ln\left(1+(-1+x)^{\frac{1}{3}}\right)}{81}-\frac{55\ln(x)}{243}-\frac{110\arctan\left(\frac{\left(1-2(-1+x)^{\frac{1}{3}}\right)\sqrt{3}}{3}\right)\sqrt{3}}{243}$$

command

```
integrate(1/(-1+x)**(2/3)/x**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

6.3 Problem number 396

$$\int \frac{\cos(x)\left(-\cos^2(x)+2\sqrt[4]{1+2\sin(x)}\right)}{(1+2\sin(x))^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{4}{(1+2\sin(x))^{\frac{1}{4}}}+\frac{(1+2\sin(x))^{\frac{3}{2}}}{12}+\frac{3}{4\sqrt{1+2\sin(x)}}-\frac{\sqrt{1+2\sin(x)}}{2}$$

command

```
integrate(cos(x)*(-cos(x)**2+2*(1+2*sin(x))**(1/4))/(1+2*sin(x))**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}&\frac{4(2\sin(x)+1)^{\frac{3}{4}}\sin^2(x)}{6\sqrt[4]{2\sin(x)+1}\sin(x)+3\sqrt[4]{2\sin(x)+1}}-\frac{2(2\sin(x)+1)^{\frac{3}{4}}\sin(x)}{6\sqrt[4]{2\sin(x)+1}\sin(x)+3\sqrt[4]{2\sin(x)+1}}\\&+\frac{3(2\sin(x)+1)^{\frac{3}{4}}\cos^2(x)}{6\sqrt[4]{2\sin(x)+1}\sin(x)+3\sqrt[4]{2\sin(x)+1}}-\frac{2(2\sin(x)+1)^{\frac{3}{4}}}{6\sqrt[4]{2\sin(x)+1}\sin(x)+3\sqrt[4]{2\sin(x)+1}}\\&-\frac{24\sin(x)}{6\sqrt[4]{2\sin(x)+1}\sin(x)+3\sqrt[4]{2\sin(x)+1}}-\frac{12}{6\sqrt[4]{2\sin(x)+1}\sin(x)+3\sqrt[4]{2\sin(x)+1}}\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

6.4 Problem number 505

$$\int \left(a^{kx}+a^{lx}\right)^4\,dx$$

Optimal antiderivative

$$\frac{a^{4kx}}{4k\ln(a)}+\frac{a^{4lx}}{4l\ln(a)}+\frac{3a^{2(k+l)x}}{(k+l)\ln(a)}+\frac{4a^{(3k+l)x}}{(3k+l)\ln(a)}+\frac{4a^{(k+3l)x}}{(k+3l)\ln(a)}$$

command

```
integrate((a**(k*x)+a**(l*x))**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

6.5 Problem number 510

$$\int \left(a^{kx}-a^{lx}\right)^4\,dx$$

Optimal antiderivative

$$\frac{a^{4kx}}{4k\ln(a)}+\frac{a^{4lx}}{4l\ln(a)}+\frac{3a^{2(k+l)x}}{(k+l)\ln(a)}-\frac{4a^{(3k+l)x}}{(3k+l)\ln(a)}-\frac{4a^{(k+3l)x}}{(k+3l)\ln(a)}$$

command

```
integrate((a**(k*x)-a**(l*x))**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

6.6 Problem number 582

$$\int \operatorname{sech}^{\frac{23}{4}}(x)\sinh^5(x)\,dx$$

Optimal antiderivative

$$-\frac{4\operatorname{sech}(x)^{\frac{3}{4}}}{3}+\frac{8\operatorname{sech}(x)^{\frac{11}{4}}}{11}-\frac{4\operatorname{sech}(x)^{\frac{19}{4}}}{19}$$

command

```
integrate(sech(x)**(3/4)*tanh(x)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{4\tanh^4(x)\operatorname{sech}^{\frac{3}{4}}(x)}{19}-\frac{64\tanh^2(x)\operatorname{sech}^{\frac{3}{4}}(x)}{209}-\frac{512\operatorname{sech}^{\frac{3}{4}}(x)}{627}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

6.7 Problem number 663

$$\int \frac{\sin^{-1}(x)}{(1-x^2)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{1}{6(-x^2+1)}+\frac{x\arcsin(x)}{3(-x^2+1)^{\frac{3}{2}}}+\frac{\ln(-x^2+1)}{3}+\frac{2x\arcsin(x)}{3\sqrt{-x^2+1}}$$

command

```
integrate(asin(x)/(-x**2+1)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\left(\begin{cases}\frac{x^3}{3(1-x^2)^{\frac{3}{2}}}+\frac{x}{\sqrt{1-x^2}} & \text{for } x>-1\wedge x<1\end{cases}\right)\operatorname{asin}(x)-\begin{cases}\text{NaN} & \text{for } x<-1\\ -\frac{2x^2\log(1-x^2)}{6x^2-6}-\frac{x^2}{6x^2-6}+\frac{2\log(1-x^2)}{6x^2-6} & \text{for } x<1\\ \text{NaN} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

6.8 Problem number 704

$$\int \cot^{-1}(\cosh(x))\coth(x)\operatorname{csch}^3(x)\,dx$$

Optimal antiderivative

$$\frac{\coth(x)}{6}-\frac{\operatorname{arccot}(\cosh(x))\operatorname{csch}(x)^3}{3}+\frac{\operatorname{arctanh}\left(\frac{\sqrt{2}\,\tanh(x)}{2}\right)\sqrt{2}}{12}$$

command

```
integrate(acot(cosh(x))*cosh(x)/sinh(x)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right)-4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{24}+\frac{\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right)+4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{24}-\frac{\tanh^3\left(\frac{x}{2}\right)\operatorname{acot}\left(\frac{\tanh^2\left(\frac{x}{2}\right)}{\tanh^2\left(\frac{x}{2}\right)-1}+\frac{1}{\tanh^2\left(\frac{x}{2}\right)-1}\right)}{24}+\frac{\tanh\left(\frac{x}{2}\right)\operatorname{acot}\left(\frac{\tanh^2\left(\frac{x}{2}\right)}{\tanh^2\left(\frac{x}{2}\right)-1}+\frac{1}{\tanh^2\left(\frac{x}{2}\right)-1}\right)}{8}+\frac{\tanh\left(\frac{x}{2}\right)}{12}-\frac{\operatorname{acot}\left(\frac{\tanh^2\left(\frac{x}{2}\right)}{\tanh^2\left(\frac{x}{2}\right)-1}+\frac{1}{\tanh^2\left(\frac{x}{2}\right)-1}\right)}{8\tanh\left(\frac{x}{2}\right)}+\frac{1}{12\tanh\left(\frac{x}{2}\right)}+\frac{\operatorname{acot}\left(\frac{\tanh^2\left(\frac{x}{2}\right)}{\tanh^2\left(\frac{x}{2}\right)-1}+\frac{1}{\tanh^2\left(\frac{x}{2}\right)-1}\right)}{24\tanh^3\left(\frac{x}{2}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7 Test file number 13

Test folder name:

test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.1_Linear/13_1.1.1.2-a+b_x-^m-c+d_x-^n

7.1 Problem number 365

$$\int \frac{1}{x(-a+bx)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2}{3a\,(bx-a)^{\frac{3}{2}}}+\frac{2\arctan\left(\frac{\sqrt{bx-a}}{\sqrt{a}}\right)}{a^{\frac{5}{2}}}+\frac{2}{a^{2}\sqrt{bx-a}}$$

command

```
integrate(1/x/(b*x-a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

7.2 Problem number 438

$$\int \sqrt{x}\,(a+bx)^{2}\,dx$$

Optimal antiderivative

$$\frac{2a^{2}x^{\frac{3}{2}}}{3}+\frac{4ab\,x^{\frac{5}{2}}}{5}+\frac{2b^{2}x^{\frac{7}{2}}}{7}$$

command

```
integrate((b*x+a)**2*x**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

7.3 Problem number 682

$$\int \frac{x^{5/3}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{5x^{\frac{2}{3}}}{2b^2}-\frac{x^{\frac{5}{3}}}{b\,(bx+a)}+\frac{5a^{\frac{2}{3}}\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{2b^{\frac{8}{3}}}-\frac{5a^{\frac{2}{3}}\ln\left(bx+a\right)}{6b^{\frac{8}{3}}}+\frac{5a^{\frac{2}{3}}\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{3b^{\frac{8}{3}}}$$

command

```
integrate(x**(5/3)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}x^{\frac{2}{3}} \\ \frac{3x^{\frac{8}{3}}}{8a^2} \\ \frac{3x^{\frac{2}{3}}}{2b^2} \\ -\frac{10a^2\log\left(\sqrt[3]{x}-\sqrt[3]{-\frac{a}{b}}\right)}{6ab^3\sqrt[3]{-\frac{a}{b}}+6b^4x\sqrt[3]{-\frac{a}{b}}}+\frac{5a^2\log\left(4x^{\frac{2}{3}}+4\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{6ab^3\sqrt[3]{-\frac{a}{b}}+6b^4x\sqrt[3]{-\frac{a}{b}}}-\frac{10\sqrt{3}\,a^2\,\mathrm{atan}\left(\frac{2\sqrt{3}\sqrt[3]{x}}{3\sqrt[3]{-\frac{a}{b}}}+\frac{\sqrt{3}}{3}\right)}{6ab^3\sqrt[3]{-\frac{a}{b}}+6b^4x\sqrt[3]{-\frac{a}{b}}}-\frac{10a^2\log(2)}{6ab^3\sqrt[3]{-\frac{a}{b}}+6b^4x} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.4 Problem number 683

$$\int \frac{x^{4/3}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{4x^{\frac{1}{3}}}{b^2}-\frac{x^{\frac{4}{3}}}{b\,(bx+a)}-\frac{2a^{\frac{1}{3}}\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{b^{\frac{7}{3}}}+\frac{2a^{\frac{1}{3}}\ln\left(bx+a\right)}{3b^{\frac{7}{3}}}+\frac{4a^{\frac{1}{3}}\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{3b^{\frac{7}{3}}}$$

command

```
integrate(x**(4/3)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\sqrt[3]{x} \\ \frac{3x^{\frac{7}{3}}}{7a^2} \\ \frac{3\sqrt[3]{x}}{b^2} \\ \frac{12a\sqrt[3]{x}}{3ab^2+3b^3x} + \frac{4a\sqrt[3]{-\frac{a}{b}}\log\left(\sqrt[3]{x}-\sqrt[3]{-\frac{a}{b}}\right)}{3ab^2+3b^3x} - \frac{2a\sqrt[3]{-\frac{a}{b}}\log\left(4x^{\frac{2}{3}}+4\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{3ab^2+3b^3x} - \frac{4\sqrt{3}a\sqrt[3]{-\frac{a}{b}}\operatorname{atan}\left(\frac{2\sqrt{3}\sqrt[3]{x}}{3\sqrt[3]{-\frac{a}{b}}}+\right.}{3ab^2+3b^3x} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.5 Problem number 688

$$\int \frac{1}{x^{4/3}(a+bx)^2}\,dx$$

Optimal antiderivative

$$-\frac{4}{a^2x^{\frac{1}{3}}}+\frac{1}{a\,x^{\frac{1}{3}}\,(bx+a)}+\frac{2b^{\frac{1}{3}}\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{a^{\frac{7}{3}}}-\frac{2b^{\frac{1}{3}}\ln\left(bx+a\right)}{3a^{\frac{7}{3}}}+\frac{4b^{\frac{1}{3}}\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{3a^{\frac{7}{3}}}$$

command

```
integrate(1/x**(4/3)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{x^{\frac{7}{3}}} \\ -\frac{3}{a^2\sqrt[3]{x}} \\ -\frac{3}{7b^2x^{\frac{7}{3}}} \\ -\frac{4a\sqrt[3]{x}\log\left(\sqrt[3]{x}-\sqrt[3]{-\frac{a}{b}}\right)}{3a^3\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+3a^2bx^{\frac{4}{3}}\sqrt[3]{-\frac{a}{b}}} + \frac{2a\sqrt[3]{x}\log\left(4x^{\frac{2}{3}}+4\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{3a^3\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+3a^2bx^{\frac{4}{3}}\sqrt[3]{-\frac{a}{b}}} - \frac{4\sqrt{3}a\sqrt[3]{x}\operatorname{atan}\left(\frac{2\sqrt{3}\sqrt[3]{x}}{3\sqrt[3]{-\frac{a}{b}}}+\frac{\sqrt{3}}{3}\right)}{3a^3\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+3a^2bx^{\frac{4}{3}}\sqrt[3]{-\frac{a}{b}}} - \frac{}{3a^3} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.6 Problem number 689

$$\int \frac{1}{x^{5/3}(a+bx)^2}\,dx$$

Optimal antiderivative

$$-\frac{5}{2a^2x^{\frac{2}{3}}}+\frac{1}{a\,x^{\frac{2}{3}}\,(bx+a)}-\frac{5b^{\frac{2}{3}}\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{2a^{\frac{8}{3}}}+\frac{5b^{\frac{2}{3}}\ln\left(bx+a\right)}{6a^{\frac{8}{3}}}+\frac{5b^{\frac{2}{3}}\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{3a^{\frac{8}{3}}}$$

command

```
integrate(1/x**(5/3)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{\tilde{\infty}}{x^{\frac{8}{3}}}\\ -\frac{3}{2a^2x^{\frac{2}{3}}}\\ -\frac{3}{8b^2x^{\frac{8}{3}}}\\ -\frac{9a^2}{6a^4x^{\frac{2}{3}}+6a^3bx^{\frac{5}{3}}}+\frac{10abx^{\frac{2}{3}}\sqrt[3]{-\frac{a}{b}}\log\left(\sqrt[3]{x}-\sqrt[3]{-\frac{a}{b}}\right)}{6a^4x^{\frac{2}{3}}+6a^3bx^{\frac{5}{3}}}-\frac{5abx^{\frac{2}{3}}\sqrt[3]{-\frac{a}{b}}\log\left(4x^{\frac{2}{3}}+4\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{6a^4x^{\frac{2}{3}}+6a^3bx^{\frac{5}{3}}}-\frac{10\sqrt{3}\,abx^{\frac{2}{3}}\sqrt[3]{-\frac{a}{b}}}{6a^4}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.7 Problem number 692

$$\int \frac{x^{2/3}}{(a+bx)^3}\,dx$$

Optimal antiderivative

$$-\frac{x^{\frac{2}{3}}}{2b\left(bx+a\right)^2}+\frac{x^{\frac{2}{3}}}{3ab\left(bx+a\right)}-\frac{\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{6a^{\frac{4}{3}}b^{\frac{5}{3}}}+\frac{\ln\left(bx+a\right)}{18a^{\frac{4}{3}}b^{\frac{5}{3}}}-\frac{\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{9a^{\frac{4}{3}}b^{\frac{5}{3}}}$$

command

`integrate(x**(2/3)/(b*x+a)**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

7.8 Problem number 693

$$\int \frac{\sqrt[3]{x}}{(a+bx)^3}\,dx$$

Optimal antiderivative

$$-\frac{x^{\frac{1}{3}}}{2b\,(bx+a)^{2}}+\frac{x^{\frac{1}{3}}}{6ab\,(bx+a)}+\frac{\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{6a^{\frac{5}{3}}b^{\frac{4}{3}}}-\frac{\ln\left(bx+a\right)}{18a^{\frac{5}{3}}b^{\frac{4}{3}}}-\frac{\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{9a^{\frac{5}{3}}b^{\frac{4}{3}}}$$

command

`integrate(x**(1/3)/(b*x+a)**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{\tilde{\infty}}{x^{\frac{5}{3}}}\\ \frac{3x^{\frac{4}{3}}}{4a^{3}}\\ -\frac{3}{5b^{3}x^{\frac{5}{3}}}\\ -\frac{6a^{2}\sqrt[3]{x}}{18a^{4}b+36a^{3}b^{2}x+18a^{2}b^{3}x^{2}}-\frac{2a^{2}\sqrt[3]{-\frac{a}{b}}\log\left(\sqrt[3]{x}-\sqrt[3]{-\frac{a}{b}}\right)}{18a^{4}b+36a^{3}b^{2}x+18a^{2}b^{3}x^{2}}+\frac{a^{2}\sqrt[3]{-\frac{a}{b}}\log\left(4x^{\frac{2}{3}}+4\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{18a^{4}b+36a^{3}b^{2}x+18a^{2}b^{3}x^{2}}+\frac{2\sqrt{3}\,a^{2}\sqrt[3]{-\frac{a}{b}}\,a}{18a^{4}b+3}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.9 Problem number 694

$$\int \frac{1}{\sqrt[3]{x}\,(a+bx)^3}\,dx$$

Optimal antiderivative

$$\frac{x^{\frac{2}{3}}}{2a\,(bx+a)^2}+\frac{2x^{\frac{2}{3}}}{3a^2\,(bx+a)}-\frac{\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{3a^{\frac{7}{3}}b^{\frac{2}{3}}}+\frac{\ln\left(bx+a\right)}{9a^{\frac{7}{3}}b^{\frac{2}{3}}}-\frac{2\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{9a^{\frac{7}{3}}b^{\frac{2}{3}}}$$

command

```
integrate(1/x**(1/3)/(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

7.10 Problem number 695

$$\int \frac{1}{x^{2/3}(a+bx)^3}\,dx$$

Optimal antiderivative

$$\frac{x^{\frac{1}{3}}}{2a\,(bx+a)^2}+\frac{5x^{\frac{1}{3}}}{6a^2\,(bx+a)}+\frac{5\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x^{\frac{1}{3}}\right)}{6a^{\frac{8}{3}}b^{\frac{1}{3}}}-\frac{5\ln\left(bx+a\right)}{18a^{\frac{8}{3}}b^{\frac{1}{3}}}-\frac{5\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x^{\frac{1}{3}}\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{9a^{\frac{8}{3}}b^{\frac{1}{3}}}$$

command

```
integrate(1/x**(2/3)/(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{x^{\frac{8}{3}}} \\ -\frac{3}{8b^3x^{\frac{8}{3}}} \\ \frac{3\sqrt[3]{x}}{a^3} \\ \frac{24a^2\sqrt[3]{x}}{18a^5+36a^4bx+18a^3b^2x^2}-\frac{10a^2\sqrt[3]{-\frac{a}{b}}\log\left(\sqrt[3]{x}-\sqrt[3]{-\frac{a}{b}}\right)}{18a^5+36a^4bx+18a^3b^2x^2}+\frac{5a^2\sqrt[3]{-\frac{a}{b}}\log\left(4x^{\frac{2}{3}}+4\sqrt[3]{x}\sqrt[3]{-\frac{a}{b}}+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{18a^5+36a^4bx+18a^3b^2x^2}+\frac{10\sqrt{3}\,a^2\sqrt[3]{-\frac{a}{b}}\ \mathrm{a}}{18a^5+36} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.11 Problem number 741

$$\int x^{-2+n}(a+bx)^{-n}\,dx$$

Optimal antiderivative

$$-\frac{x^{-1+n}(bx+a)^{1-n}}{a(1-n)}$$

command

`integrate(x**(-2+n)/((b*x+a)**n),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1}{bx} & \text{for } a=0 \wedge n=1 \\ -\frac{x^n(bx)^{-n}}{x} & \text{for } a=0 \\ \frac{\log(x)}{a}-\frac{\log\left(\frac{a}{b}+x\right)}{a} & \text{for } n=1 \\ \frac{ax^n}{anx(a+bx)^n-ax(a+bx)^n}+\frac{bxx^n}{anx(a+bx)^n-ax(a+bx)^n} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.12 Problem number 742

$$\int x^{-1+n}(a+bx)^{-n}\,dx$$

Optimal antiderivative

$$\frac{x^n\left(1+\frac{bx}{a}\right)^n \text{hypergeom}\left([n,n],[1+n],-\frac{bx}{a}\right)(bx+a)^{-n}}{n}$$

command

`integrate(x**(-1+n)/((b*x+a)**n),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^{-n}x^n\Gamma(n)\,{}_2F_1\left(\left.\begin{matrix} n,n \\ n+1 \end{matrix}\right| \frac{bxe^{i\pi}}{a}\right)}{\Gamma(n+1)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.13 Problem number 744

$$\int x^{1+n}(a+bx)^{-n}\,dx$$

Optimal antiderivative

$$\frac{x^{2+n}\left(1+\frac{bx}{a}\right)^n \text{hypergeom}\left(\left[n,2+n\right],\left[3+n\right],-\frac{bx}{a}\right)(bx+a)^{-n}}{2+n}$$

command

```
integrate(x**(1+n)/((b*x+a)**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^{-n}x^2x^n\Gamma(n+2)\,{}_2F_1\left(\begin{matrix} n,n+2 \\ n+3 \end{matrix}\middle| \frac{bxe^{i\pi}}{a}\right)}{\Gamma\left(n+3\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.14 Problem number 749

$$\int \frac{(a+bx)^n}{x^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2(bx+a)^n \text{hypergeom}\left(\left[-\frac{3}{2},-n\right],\left[-\frac{1}{2}\right],-\frac{bx}{a}\right)\left(1+\frac{bx}{a}\right)^{-n}}{3x^{\frac{3}{2}}}$$

command

```
integrate((b*x+a)**n/x**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2a^n{}_2F_1\left(\begin{matrix} -\frac{3}{2},-n \\ -\frac{1}{2} \end{matrix}\middle| \frac{bxe^{i\pi}}{a}\right)}{3x^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.15 Problem number 753

$$\int x^{-1+n}(a+bx)^{-1-n}\,dx$$

Optimal antiderivative

$$\frac{x^n(bx+a)^{-n}}{an}$$

command

```
integrate(x**(-1+n)*(b*x+a)**(-1-n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x^n(bx)^{-n}}{bx} & \text{for } a = \\ \frac{0^{-n-1}x^n}{n} & \text{for } a = \\ \frac{x^n\left(0^{\frac{1}{n}}\right)^{-n-1}}{n} & \text{for } a = \\ \frac{\log(x)}{a} - \frac{\log\left(\frac{a}{b}+x\right)}{a} & \text{for } n = \\ \frac{a^2x^n}{a^3n(a+bx)^n+2a^2bnx(a+bx)^n+ab^2nx^2(a+bx)^n} + \frac{abxx^n}{a^3n(a+bx)^n+2a^2bnx(a+bx)^n+ab^2nx^2(a+bx)^n} + \frac{bxx^n}{a^2n(a+bx)^n+abnx(a+bx)^n} & \text{otherw} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.16 Problem number 989

$$\int x\left(cx^2\right)^p(a+bx)^{-3-2p}\,dx$$

Optimal antiderivative

$$\frac{x^2\left(c\,x^2\right)^p(bx+a)^{-2-2p}}{2a\,(1+p)}$$

command

```
integrate(x*(c*x**2)**p*(b*x+a)**(-3-2*p),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

7.17 Problem number 1136

$$\int \frac{1}{(1-x)^{11/2}(1+x)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{1}{9\left(1-x\right)^{\frac{9}{2}}\left(1+x\right)^{\frac{3}{2}}}+\frac{2}{21\left(1-x\right)^{\frac{7}{2}}\left(1+x\right)^{\frac{3}{2}}}+\frac{2}{21\left(1-x\right)^{\frac{5}{2}}\left(1+x\right)^{\frac{3}{2}}}+\frac{8x}{63\left(1-x\right)^{\frac{3}{2}}\left(1+x\right)^{\frac{3}{2}}}+\frac{16x}{63\sqrt{1-x}\,\sqrt{1+x}}$$

command

```
integrate(1/(1-x)**(11/2)/(1+x)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

7.18 Problem number 1144

$$\int \frac{1}{(a+ax)^{9/2}(c-cx)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{x}{7ac\left(ax+a\right)^{\frac{7}{2}}\left(-cx+c\right)^{\frac{7}{2}}}+\frac{6x}{35a^{2}c^{2}\left(ax+a\right)^{\frac{5}{2}}\left(-cx+c\right)^{\frac{5}{2}}}+\frac{8x}{35a^{3}c^{3}\left(ax+a\right)^{\frac{3}{2}}\left(-cx+c\right)^{\frac{3}{2}}}+\frac{16x}{35a^{4}c^{4}\sqrt{ax+a}\,\sqrt{-cx+c}}$$

command

```
integrate(1/(a*x+a)**(9/2)/(-c*x+c)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{4iG_{6,6}^{5,3}\left(\begin{matrix}\frac{9}{4},\frac{11}{4},1 & \frac{1}{2},\frac{9}{2},5\\ \frac{9}{4},\frac{11}{4},4,\frac{9}{2},5 & 0\end{matrix}\middle|\frac{1}{x^{2}}\right)}{105\pi^{\frac{3}{2}}a^{\frac{9}{2}}c^{\frac{9}{2}}}+\frac{4G_{6,6}^{2,6}\left(\begin{matrix}-\frac{1}{2},0,\frac{1}{2},\frac{7}{4},\frac{9}{4},1 & \\ \frac{7}{4},\frac{9}{4} & -\frac{1}{2},0,4,0\end{matrix}\middle|\frac{e^{-2i\pi}}{x^{2}}\right)}{105\pi^{\frac{3}{2}}a^{\frac{9}{2}}c^{\frac{9}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.19 Problem number 1152

$$\int \frac{1}{(a+bx)^{9/2}(ac-bcx)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{x}{7a^2c\,(bx+a)^{\frac{7}{2}}\,(-bcx+ac)^{\frac{7}{2}}}+\frac{6x}{35a^4c^2\,(bx+a)^{\frac{5}{2}}\,(-bcx+ac)^{\frac{5}{2}}}+\frac{8x}{35a^6c^3\,(bx+a)^{\frac{3}{2}}\,(-bcx+ac)^{\frac{3}{2}}}+\frac{16x}{35a^8c^4\sqrt{bx+a}\,\sqrt{-bcx+ac}}$$

command

```
integrate(1/(b*x+a)**(9/2)/(-b*c*x+a*c)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{4iG_{6,6}^{5,3}\left(\begin{matrix}\frac{9}{4},\frac{11}{4},1 & \frac{1}{2},\frac{9}{2},5\\ \frac{9}{4},\frac{11}{4},4,\frac{9}{2},5 & 0\end{matrix}\middle|\,\frac{a^2}{b^2x^2}\right)}{105\pi^{\frac{3}{2}}a^8bc^{\frac{9}{2}}}+\frac{4G_{6,6}^{2,6}\left(\begin{matrix}-\frac{1}{2},0,\frac{1}{2},\frac{7}{4},\frac{9}{4},1 & \\ \frac{7}{4},\frac{9}{4} & -\frac{1}{2},0,4,0\end{matrix}\middle|\,\frac{a^2e^{-2i\pi}}{b^2x^2}\right)}{105\pi^{\frac{3}{2}}a^8bc^{\frac{9}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.20 Problem number 1383

$$\int \frac{\sqrt{c+dx}}{(a+bx)^3}\,dx$$

Optimal antiderivative

$$\frac{d^2\,\mathrm{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{4b^{\frac{3}{2}}\,(-ad+bc)^{\frac{3}{2}}}-\frac{\sqrt{dx+c}}{2b\,(bx+a)^2}-\frac{d\sqrt{dx+c}}{4b\,(-ad+bc)\,(bx+a)}$$

command

```
integrate((d*x+c)**(1/2)/(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

7.21 Problem number 1394

$$\int \frac{(c+dx)^{3/2}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$-\frac{(dx+c)^{\frac{3}{2}}}{b\,(bx+a)}-\frac{3d\,\mathrm{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)\sqrt{-ad+bc}}{b^{\frac{5}{2}}}+\frac{3d\sqrt{dx+c}}{b^2}$$

command

```
integrate((d*x+c)**(3/2)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2a^{2}d^{3}\sqrt{c+dx}}{2a^{2}b^{2}d^{2}-2ab^{3}cd+2ab^{3}d^{2}x-2b^{4}cdx}$$

$$-\frac{a^{2}d^{3}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}\log\left(-a^{2}d^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+2abcd\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}-b^{2}c^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+\sqrt{c+dx}\right.}{2b^{2}}$$

$$+\frac{a^{2}d^{3}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}\log\left(a^{2}d^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}-2abcd\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+b^{2}c^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+\sqrt{c+dx}\right)}{2b^{2}}$$

$$-\frac{4acd^{2}\sqrt{c+dx}}{2a^{2}bd^{2}-2ab^{2}cd+2ab^{2}d^{2}x-2b^{3}cdx}$$

$$+\frac{acd^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}\log\left(-a^{2}d^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+2abcd\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}-b^{2}c^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+\sqrt{c+dx}\right.}{b}$$

$$-\frac{acd^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}\log\left(a^{2}d^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}-2abcd\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+b^{2}c^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+\sqrt{c+dx}\right)}{b}$$

$$-\frac{4ad^{2}\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{b^{3}\sqrt{\frac{ad}{b}-c}}$$

$$-\frac{c^{2}d\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}\log\left(-a^{2}d^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+2abcd\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}-b^{2}c^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+\sqrt{c+dx}\right)}{2}$$

$$+\frac{c^{2}d\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}\log\left(a^{2}d^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}-2abcd\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+b^{2}c^{2}\sqrt{-\frac{1}{b\left(ad-bc\right)^{3}}}+\sqrt{c+dx}\right)}{2}$$

$$+\frac{2c^{2}d\sqrt{c+dx}}{2a^{2}d^{2}-2abcd+2abd^{2}x-2b^{2}cdx}+\frac{4cd\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{b^{2}\sqrt{\frac{ad}{b}-c}}+\frac{2d\sqrt{c+dx}}{b^{2}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

7.22 Problem number 1406

$$\int \frac{(c+dx)^{5/2}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{5d(dx+c)^{\frac{3}{2}}}{3b^2}-\frac{(dx+c)^{\frac{5}{2}}}{b\,(bx+a)}-\frac{5d(-ad+bc)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{b^{\frac{7}{2}}}+\frac{5d(-ad+bc)\sqrt{dx+c}}{b^3}$$

command

```
integrate((d*x+c)**(5/2)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8 Test file number 14

Test folder name:

`test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.1_Linear/14_1.1.1.3-a+b_x-^m-c+d_x-^n-e+f_x-^p`

8.1 Problem number 50

$$\int \frac{(ex)^{5/2}}{(a+bx)(ac-bcx)}\,dx$$

Optimal antiderivative

$$-\frac{2e(ex)^{\frac{3}{2}}}{3b^2c}-\frac{a^{\frac{3}{2}}e^{\frac{5}{2}}\arctan\left(\frac{\sqrt{b}\,\sqrt{ex}}{\sqrt{a}\,\sqrt{e}}\right)}{b^{\frac{7}{2}}c}+\frac{a^{\frac{3}{2}}e^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex}}{\sqrt{a}\,\sqrt{e}}\right)}{b^{\frac{7}{2}}c}$$

command

```
integrate((e*x)**(5/2)/(b*x+a)/(-b*c*x+a*c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a^{\frac{3}{2}} e^{\frac{5}{2}} \operatorname{acoth}\left(\frac{\sqrt{a}}{\sqrt{b}\sqrt{x}}\right)}{b^{\frac{7}{2}} c} + \frac{a^{\frac{3}{2}} e^{\frac{5}{2}} \operatorname{atan}\left(\frac{\sqrt{a}}{\sqrt{b}\sqrt{x}}\right)}{b^{\frac{7}{2}} c} - \frac{2e^{\frac{5}{2}} x^{\frac{3}{2}}}{3b^2 c} - \frac{e^{\frac{5}{2}} x^{\frac{5}{2}}}{5abc} & \text{for } \left|\frac{a}{bx}\right| > 1 \\ \frac{a^{\frac{3}{2}} e^{\frac{5}{2}} \operatorname{atan}\left(\frac{\sqrt{a}}{\sqrt{b}\sqrt{x}}\right)}{b^{\frac{7}{2}} c} + \frac{a^{\frac{3}{2}} e^{\frac{5}{2}} \operatorname{atanh}\left(\frac{\sqrt{a}}{\sqrt{b}\sqrt{x}}\right)}{b^{\frac{7}{2}} c} - \frac{2e^{\frac{5}{2}} x^{\frac{3}{2}}}{3b^2 c} - \frac{e^{\frac{5}{2}} x^{\frac{5}{2}}}{5abc} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.2 Problem number 55

$$\int \frac{1}{(ex)^{5/2}(a+bx)(ac-bcx)}\,dx$$

Optimal antiderivative

$$-\frac{2}{3a^2ce\,(ex)^{\frac{3}{2}}} + \frac{b^{\frac{3}{2}} \arctan\left(\frac{\sqrt{b}\,\sqrt{ex}}{\sqrt{a}\,\sqrt{e}}\right)}{a^{\frac{7}{2}} c\, e^{\frac{5}{2}}} + \frac{b^{\frac{3}{2}} \operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex}}{\sqrt{a}\,\sqrt{e}}\right)}{a^{\frac{7}{2}} c\, e^{\frac{5}{2}}}$$

command

```
integrate(1/(e*x)**(5/2)/(b*x+a)/(-b*c*x+a*c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{1}{5abce^{\frac{5}{2}}x^{\frac{5}{2}}} - \frac{2}{3a^2ce^{\frac{5}{2}}x^{\frac{3}{2}}} + \frac{b^{\frac{3}{2}} \operatorname{acoth}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{a}}\right)}{a^{\frac{7}{2}}ce^{\frac{5}{2}}} + \frac{b^{\frac{3}{2}} \operatorname{atan}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{a}}\right)}{a^{\frac{7}{2}}ce^{\frac{5}{2}}} \\ -\frac{i(3+3i)}{30abce^{\frac{5}{2}}x^{\frac{5}{2}}} + \frac{3+3i}{30abce^{\frac{5}{2}}x^{\frac{5}{2}}} + \frac{-10-10i}{30a^2ce^{\frac{5}{2}}x^{\frac{3}{2}}} - \frac{i(-10-10i)}{30a^2ce^{\frac{5}{2}}x^{\frac{3}{2}}} - \frac{ib^{\frac{3}{2}}\cdot(15+15i)\operatorname{atan}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{a}}\right)}{30a^{\frac{7}{2}}ce^{\frac{5}{2}}} + \frac{b^{\frac{3}{2}}\cdot(15+15i)\operatorname{atan}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{a}}\right)}{30a^{\frac{7}{2}}ce^{\frac{5}{2}}} - \cdots \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.3 Problem number 353

$$\int \frac{A+Bx}{x^{11/2}(a+bx)}\,dx$$

Optimal antiderivative

$$-\frac{2A}{9a\,x^{\frac{9}{2}}}+\frac{\frac{2Ab}{7}-\frac{2Ba}{7}}{a^{2}x^{\frac{7}{2}}}-\frac{2b(Ab-Ba)}{5a^{3}x^{\frac{5}{2}}}+\frac{2b^{2}(Ab-Ba)}{3a^{4}x^{\frac{3}{2}}}-\frac{2b^{\frac{7}{2}}(Ab-Ba)\arctan\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{a^{\frac{11}{2}}}-\frac{2b^{3}(Ab-Ba)}{a^{5}\sqrt{x}}$$

command

```
integrate((B*x+A)/x**(11/2)/(b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{9x^{\frac{9}{2}}}\right) \\ \frac{-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{9x^{\frac{9}{2}}}}{b} \\ \frac{-\frac{2A}{9x^{\frac{9}{2}}}-\frac{2B}{7x^{\frac{7}{2}}}}{a} \\ -\frac{2A}{9ax^{\frac{9}{2}}}+\frac{2Ab}{7a^{2}x^{\frac{7}{2}}}-\frac{2Ab^{2}}{5a^{3}x^{\frac{5}{2}}}+\frac{2Ab^{3}}{3a^{4}x^{\frac{3}{2}}}-\frac{Ab^{4}\log\left(\sqrt{x}-\sqrt{-\frac{a}{b}}\right)}{a^{5}\sqrt{-\frac{a}{b}}}+\frac{Ab^{4}\log\left(\sqrt{x}+\sqrt{-\frac{a}{b}}\right)}{a^{5}\sqrt{-\frac{a}{b}}}-\frac{2Ab^{4}}{a^{5}\sqrt{x}}-\frac{2B}{7ax^{\frac{7}{2}}}+\frac{2Bb}{5a^{2}x^{\frac{5}{2}}}-\frac{2Bb}{3a^{3}x} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.4 Problem number 363

$$\int \frac{x^{7/2}(A+Bx)}{(a+bx)^{3}}\,dx$$

Optimal antiderivative

$$\frac{7(5Ab-9Ba)\,x^{\frac{3}{2}}}{12b^{4}}-\frac{7(5Ab-9Ba)\,x^{\frac{5}{2}}}{20a\,b^{3}}+\frac{(Ab-Ba)\,x^{\frac{9}{2}}}{2ab\,(bx+a)^{2}}+\frac{(5Ab-9Ba)\,x^{\frac{7}{2}}}{4a\,b^{2}\,(bx+a)}+\frac{7a^{\frac{3}{2}}(5Ab-9Ba)\arctan\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{4b^{\frac{11}{2}}}-\frac{7a(5Ab-9Ba)\sqrt{x}}{4b^{5}}$$

command

```
integrate(x**(7/2)*(B*x+A)/(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.5 Problem number 407

$$\int \frac{(a+bx)^{3/2}(A+Bx)}{x^5}\,dx$$

Optimal antiderivative

$$\frac{(3Ab-8Ba)\,(bx+a)^{\frac{3}{2}}}{24x^3a}-\frac{A(bx+a)^{\frac{5}{2}}}{4a\,x^4}-\frac{b^3(3Ab-8Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{64a^{\frac{5}{2}}}+\frac{b(3Ab-8Ba)\,\sqrt{bx+a}}{32a\,x^2}+\frac{b^2(3Ab-8Ba)\,\sqrt{bx+a}}{64a^2x}$$

command

```
integrate((b*x+a)**(3/2)*(B*x+A)/x**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.6 Problem number 408

$$\int \frac{(a+bx)^{3/2}(A+Bx)}{x^6}\,dx$$

Optimal antiderivative

$$\frac{(Ab-2Ba)\,(bx+a)^{\frac{3}{2}}}{8a\,x^4}-\frac{A(bx+a)^{\frac{5}{2}}}{5a\,x^5}+\frac{3b^4(Ab-2Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{128a^{\frac{7}{2}}}+\frac{b(Ab-2Ba)\,\sqrt{bx+a}}{16x^3a}+\frac{b^2(Ab-2Ba)\,\sqrt{bx+a}}{64a^2x^2}-\frac{3b^3(Ab-2Ba)\,\sqrt{bx+a}}{128a^3x}$$

command

```
integrate((b*x+a)**(3/2)*(B*x+A)/x**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.7 Problem number 409

$$\int \frac{(a+bx)^{3/2}(A+Bx)}{x^7}\,dx$$

Optimal antiderivative

$$\frac{(7Ab-12Ba)\,(bx+a)^{\frac{3}{2}}}{60a\,x^5}-\frac{A(bx+a)^{\frac{5}{2}}}{6a\,x^6}-\frac{b^5(7Ab-12Ba)\operatorname{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{512a^{\frac{9}{2}}}+\frac{b(7Ab-12Ba)\,\sqrt{bx+a}}{160a\,x^4}+\frac{b^2(7Ab-12Ba)\,\sqrt{bx+a}}{960a^2x^3}-\frac{b^3(7Ab-12Ba)\,\sqrt{bx+a}}{768a^3x^2}+\frac{b^4(7Ab-12Ba)\,\sqrt{bx+a}}{512a^4x}$$

command

```
integrate((b*x+a)**(3/2)*(B*x+A)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.8 Problem number 419

$$\int \frac{(a+bx)^{5/2}(A+Bx)}{x^5}\,dx$$

Optimal antiderivative

$$\frac{5b(Ab-8Ba)\,(bx+a)^{\frac{3}{2}}}{96a\,x^2}+\frac{(Ab-8Ba)\,(bx+a)^{\frac{5}{2}}}{24x^3a}-\frac{A(bx+a)^{\frac{7}{2}}}{4a\,x^4}+\frac{5b^3(Ab-8Ba)\operatorname{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{64a^{\frac{3}{2}}}+\frac{5b^2(Ab-8Ba)\,\sqrt{bx+a}}{64ax}$$

command

```
integrate((b*x+a)**(5/2)*(B*x+A)/x**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.9 Problem number 420

$$\int \frac{(a+bx)^{5/2}(A+Bx)}{x^6}\,dx$$

Optimal antiderivative

$$\frac{b(3Ab-10Ba)\,(bx+a)^{\frac{3}{2}}}{48x^3a}+\frac{(3Ab-10Ba)\,(bx+a)^{\frac{5}{2}}}{40a\,x^4}-\frac{A(bx+a)^{\frac{7}{2}}}{5a\,x^5}-\frac{b^4(3Ab-10Ba)\operatorname{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{128a^{\frac{5}{2}}}+\frac{b^2(3Ab-10Ba)\,\sqrt{bx+a}}{64a\,x^2}+\frac{b^3(3Ab-10Ba)\,\sqrt{bx+a}}{128a^2x}$$

command

```
integrate((b*x+a)**(5/2)*(B*x+A)/x**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.10 Problem number 421

$$\int \frac{(a+bx)^{5/2}(A+Bx)}{x^7}\,dx$$

Optimal antiderivative

$$\frac{b(5Ab-12Ba)\,(bx+a)^{\frac{3}{2}}}{96a\,x^4}+\frac{(5Ab-12Ba)\,(bx+a)^{\frac{5}{2}}}{60a\,x^5}-\frac{A(bx+a)^{\frac{7}{2}}}{6a\,x^6}+\frac{b^5(5Ab-12Ba)\operatorname{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{512a^{\frac{7}{2}}}+\frac{b^2(5Ab-12Ba)\,\sqrt{bx+a}}{192x^3a}+\frac{b^3(5Ab-12Ba)\,\sqrt{bx+a}}{768a^2x^2}-\frac{b^4(5Ab-12Ba)\,\sqrt{bx+a}}{512a^3x}$$

command

```
integrate((b*x+a)**(5/2)*(B*x+A)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.11 Problem number 422

$$\int \frac{(a+bx)^{5/2}(A+Bx)}{x^8}\,dx$$

Optimal antiderivative

$$\frac{b(Ab-2Ba)\left(bx+a\right)^{\frac{3}{2}}}{24a\,x^{5}}+\frac{(Ab-2Ba)\left(bx+a\right)^{\frac{5}{2}}}{12a\,x^{6}}-\frac{A(bx+a)^{\frac{7}{2}}}{7a\,x^{7}}-\frac{5b^{6}(Ab-2Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{1024a^{\frac{9}{2}}}+\frac{b^{2}(Ab-2Ba)\sqrt{bx+a}}{64a\,x^{4}}+\frac{b^{3}(Ab-2Ba)\sqrt{bx+a}}{384a^{2}x^{3}}-\frac{5b^{4}(Ab-2Ba)\sqrt{bx+a}}{1536a^{3}x^{2}}+\frac{5b^{5}(Ab-2Ba)\sqrt{bx+a}}{1024a^{4}x}$$

command

```
integrate((b*x+a)**(5/2)*(B*x+A)/x**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.12 Problem number 443

$$\int \frac{A+Bx}{x^5(a+bx)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{35b^{3}(9Ab-8Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{bx+a}}{\sqrt{a}}\right)}{64a^{\frac{11}{2}}}+\frac{35b^{3}(9Ab-8Ba)}{64a^{5}\sqrt{bx+a}}-\frac{A}{4a\,x^{4}\sqrt{bx+a}}+\frac{9Ab-8Ba}{24a^{2}x^{3}\sqrt{bx+a}}-\frac{7b(9Ab-8Ba)}{96a^{3}x^{2}\sqrt{bx+a}}+\frac{35b^{2}(9Ab-8Ba)}{192a^{4}x\sqrt{bx+a}}$$

command

```
integrate((B*x+A)/x**5/(b*x+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{1}{4a\sqrt{b}\,x^{\frac{9}{2}}\sqrt{\frac{a}{bx}+1}}+\frac{3\sqrt{b}}{8a^2x^{\frac{7}{2}}\sqrt{\frac{a}{bx}+1}}-\frac{21b^{\frac{3}{2}}}{32a^3x^{\frac{5}{2}}\sqrt{\frac{a}{bx}+1}}+\frac{105b^{\frac{5}{2}}}{64a^4x^{\frac{3}{2}}\sqrt{\frac{a}{bx}+1}}+\frac{315b^{\frac{7}{2}}}{64a^5\sqrt{x}\sqrt{\frac{a}{bx}+1}}-\frac{315b^4\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\sqrt{x}}\right)}{64a^{\frac{11}{2}}}\right)+B\left(-\frac{1}{3a\sqrt{b}\,x^{\frac{7}{2}}\sqrt{\frac{a}{bx}+1}}+\frac{7\sqrt{b}}{12a^2x^{\frac{5}{2}}\sqrt{\frac{a}{bx}+1}}-\frac{35b^{\frac{3}{2}}}{24a^3x^{\frac{3}{2}}\sqrt{\frac{a}{bx}+1}}-\frac{35b^{\frac{5}{2}}}{8a^4\sqrt{x}\sqrt{\frac{a}{bx}+1}}+\frac{35b^3\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\sqrt{x}}\right)}{8a^{\frac{9}{2}}}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.13 Problem number 461

$$\int\frac{(c+dx)^{5/2}}{x^3(a+bx)}\,dx$$

Optimal antiderivative

$$-\frac{c(dx+c)^{\frac{3}{2}}}{2a\,x^2}+\frac{2(-ad+bc)^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{a^3\sqrt{b}}-\frac{(15a^2d^2-20abcd+8b^2c^2)\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)\sqrt{c}}{4a^3}+\frac{c(-7ad+4bc)\sqrt{dx+c}}{4a^2x}$$

command

```
integrate((d*x+c)**(5/2)/x**3/(b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$- \frac{10c^4d^2\sqrt{c+dx}}{-8ac^4 - 16ac^3dx + 8ac^2(c+dx)^2} + \frac{6c^3d^2(c+dx)^{\frac{3}{2}}}{-8ac^4 - 16ac^3dx + 8ac^2(c+dx)^2}$$
$$+ \frac{2d^3\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{b\sqrt{\frac{ad}{b}-c}} + \frac{3c^3d^2\sqrt{\frac{1}{c^5}}\log\left(-c^3\sqrt{\frac{1}{c^5}}+\sqrt{c+dx}\right)}{8a}$$
$$- \frac{3c^3d^2\sqrt{\frac{1}{c^5}}\log\left(c^3\sqrt{\frac{1}{c^5}}+\sqrt{c+dx}\right)}{8a} - \frac{3c^2d^2\sqrt{\frac{1}{c^3}}\log\left(-c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)}{2a}$$
$$+ \frac{3c^2d^2\sqrt{\frac{1}{c^3}}\log\left(c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)}{2a} - \frac{6cd^2\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{a\sqrt{\frac{ad}{b}-c}}$$
$$+ \frac{6cd^2\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{-c}}\right)}{a\sqrt{-c}} - \frac{3cd\sqrt{c+dx}}{ax} + \frac{bc^3d\sqrt{\frac{1}{c^3}}\log\left(-c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)}{2a^2}$$
$$- \frac{bc^3d\sqrt{\frac{1}{c^3}}\log\left(c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)}{2a^2} + \frac{6bc^2d\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{a^2\sqrt{\frac{ad}{b}-c}}$$
$$- \frac{6bc^2d\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{-c}}\right)}{a^2\sqrt{-c}} + \frac{bc^2\sqrt{c+dx}}{a^2x}$$
$$- \frac{2b^2c^3\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{a^3\sqrt{\frac{ad}{b}-c}} + \frac{2b^2c^3\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{-c}}\right)}{a^3\sqrt{-c}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.14 Problem number 462

$$\int \frac{(c+dx)^{5/2}}{x^4(a+bx)}\,dx$$

Optimal antiderivative

$$-\frac{c(dx+c)^{\frac{3}{2}}}{3x^3a}-\frac{2(-ad+bc)^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)\sqrt{b}}{a^4}+\frac{\left(-5a^3d^3+30a^2bc\,d^2-40a\,b^2c^2d+16b^3c^3\right)\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)}{8a^4\sqrt{c}}+\frac{c(-3ad+2bc)\sqrt{dx+c}}{4a^2x^2}-\frac{\left(11a^2d^2-18abcd+8b^2c^2\right)\sqrt{dx+c}}{8a^3x}$$

command

```
integrate((d*x+c)**(5/2)/x**4/(b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.15 Problem number 466

$$\int \frac{(c+dx)^{3/2}}{x(a+bx)^2}\,dx$$

Optimal antiderivative

$$-\frac{2c^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)}{a^2}+\frac{(ad+2bc)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)\sqrt{-ad+bc}}{a^2b^{\frac{3}{2}}}+\frac{(-ad+bc)\sqrt{dx+c}}{ab\,(bx+a)}$$

command

```
integrate((d*x+c)**(3/2)/x/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
-\frac{2ad^3\sqrt{c+dx}}{2a^2bd^2-2ab^2cd+2ab^2d^2x-2b^3cdx}
$$

$$
+\frac{ad^3\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(-a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}+2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}-b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{2b}
$$

$$
-\frac{ad^3\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}-2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}+b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{2b}
$$

$$
-\frac{2bc^2d\sqrt{c+dx}}{2a^3d^2-2a^2bcd+2a^2bd^2x-2ab^2cdx}
$$

$$
-cd^2\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(-a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}+2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}-b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)
$$

$$
+cd^2\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}-2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}+b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)
$$

$$
+\frac{4cd^2\sqrt{c+dx}}{2a^2d^2-2abcd+2abd^2x-2b^2cdx}+\frac{2d^2\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{b^2\sqrt{\frac{ad}{b}-c}}
$$

$$
+\frac{bc^2d\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(-a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}+2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}-b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{2a}
$$

$$
-\frac{bc^2d\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}-2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}+b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{2a}
$$

$$
-\frac{2c^2\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{a^2\sqrt{\frac{ad}{b}-c}}+\frac{2c^2\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{-c}}\right)}{a^2\sqrt{-c}}
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.16 Problem number 467

$$\int \frac{(c+dx)^{3/2}}{x^2(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{(-3ad+4bc)\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)\sqrt{c}}{a^3} - \frac{(-ad+4bc)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)\sqrt{-ad+bc}}{a^3\sqrt{b}} - \frac{(-ad+2bc)\sqrt{dx+c}}{a^2\,(bx+a)} - \frac{c\sqrt{dx+c}}{ax\,(bx+a)}$$

command

```
integrate((d*x+c)**(3/2)/x**2/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2b^2c^2d\sqrt{c+dx}}{2a^4d^2-2a^3bcd+2a^3bd^2x-2a^2b^2cdx}-\frac{4bcd^2\sqrt{c+dx}}{2a^3d^2-2a^2bcd+2a^2bd^2x-2ab^2cdx}$$
$$-\frac{d^3\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(-a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}+2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}-b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{2}$$
$$+\frac{d^3\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}-2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}+b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{2}$$
$$+\frac{2d^3\sqrt{c+dx}}{2a^2d^2-2abcd+2abd^2x-2b^2cdx}$$
$$+\frac{bcd^2\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(-a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}+2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}-b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right.}{a}$$
$$-\frac{bcd^2\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}-2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}+b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{a}$$
$$-\frac{b^2c^2d\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(-a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}+2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}-b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right.}{2a^2}$$
$$+\frac{b^2c^2d\sqrt{-\frac{1}{b(ad-bc)^3}}\log\left(a^2d^2\sqrt{-\frac{1}{b(ad-bc)^3}}-2abcd\sqrt{-\frac{1}{b(ad-bc)^3}}+b^2c^2\sqrt{-\frac{1}{b(ad-bc)^3}}+\sqrt{c+dx}\right)}{2a^2}$$
$$-\frac{c^2d\sqrt{\frac{1}{c^3}}\log\left(-c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)}{2a^2}+\frac{c^2d\sqrt{\frac{1}{c^3}}\log\left(c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)}{2a^2}$$
$$-\frac{4cd\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{a^2\sqrt{\frac{ad}{b}-c}}+\frac{4cd\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{-c}}\right)}{a^2\sqrt{-c}}-\frac{c\sqrt{c+dx}}{a^2x}$$
$$+\frac{4bc^2\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{\frac{ad}{b}-c}}\right)}{a^3\sqrt{\frac{ad}{b}-c}}-\frac{4bc^2\operatorname{atan}\left(\frac{\sqrt{c+dx}}{\sqrt{-c}}\right)}{a^3\sqrt{-c}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.17 Problem number 469

$$\int \frac{x^2(c+dx)^{5/2}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$-\frac{a(-9ad+4bc)\,(dx+c)^{\frac{3}{2}}}{3b^4}-\frac{a(-9ad+4bc)\,(dx+c)^{\frac{5}{2}}}{5b^3\,(-ad+bc)}+\frac{2(dx+c)^{\frac{7}{2}}}{7b^2d}-\frac{a^2(dx+c)^{\frac{7}{2}}}{b^2\,(-ad+bc)\,(bx+a)}+\frac{a(-9ad+4bc)\,(-ad+bc)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{b^{\frac{11}{2}}}-\frac{a(-9ad+4bc)\,(-ad+bc)\,\sqrt{dx+c}}{b^5}$$

command

```
integrate(x**2*(d*x+c)**(5/2)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.18 Problem number 470

$$\int \frac{x(c+dx)^{5/2}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{(-7ad+2bc)\,(dx+c)^{\frac{3}{2}}}{3b^3}+\frac{(-7ad+2bc)\,(dx+c)^{\frac{5}{2}}}{5b^2\,(-ad+bc)}+\frac{a(dx+c)^{\frac{7}{2}}}{b\,(-ad+bc)\,(bx+a)}-\frac{(-7ad+2bc)\,(-ad+bc)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{b^{\frac{9}{2}}}+\frac{(-7ad+2bc)\,(-ad+bc)\,\sqrt{dx+c}}{b^4}$$

command

```
integrate(x*(d*x+c)**(5/2)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.19 Problem number 471

$$\int \frac{(c+dx)^{5/2}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{5d(dx+c)^{\frac{3}{2}}}{3b^2}-\frac{(dx+c)^{\frac{5}{2}}}{b\,(bx+a)}-\frac{5d(-ad+bc)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{b^{\frac{7}{2}}}+\frac{5d(-ad+bc)\sqrt{dx+c}}{b^3}$$

command

```
integrate((d*x+c)**(5/2)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.20 Problem number 472

$$\int \frac{(c+dx)^{5/2}}{x(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{(-ad+bc)\,(dx+c)^{\frac{3}{2}}}{ab\,(bx+a)}-\frac{2c^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)}{a^2}+\frac{(-ad+bc)^{\frac{3}{2}}\,(3ad+2bc)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{a^2b^{\frac{5}{2}}}-\frac{d(-3ad+bc)\sqrt{dx+c}}{a\,b^2}$$

command

```
integrate((d*x+c)**(5/2)/x/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.21 Problem number 473

$$\int \frac{(c+dx)^{5/2}}{x^2(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{c^{\frac{3}{2}}(-5ad+4bc)\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)}{a^3}-\frac{(-ad+bc)^{\frac{3}{2}}\,(ad+4bc)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{a^3b^{\frac{3}{2}}}-\frac{c^2\sqrt{dx+c}}{a^2x}-\frac{(-ad+bc)^2\sqrt{dx+c}}{a^2b\,(bx+a)}$$

command

```
integrate((d*x+c)**(5/2)/x**2/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.22 Problem number 474

$$\int \frac{(c+dx)^{5/2}}{x^3(a+bx)^2}\,dx$$

Optimal antiderivative

$$-\frac{c(dx+c)^{\frac{3}{2}}}{2a\,x^2\,(bx+a)}+\frac{(-ad+bc)^{\frac{3}{2}}\,(-ad+6bc)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)}{a^4\sqrt{b}}-\frac{(15a^2d^2-40abcd+24b^2c^2)\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)\sqrt{c}}{4a^4}+\frac{(4a^2d^2-17abcd+12b^2c^2)\sqrt{dx+c}}{4a^3\,(bx+a)}+\frac{c(-7ad+6bc)\sqrt{dx+c}}{4a^2x\,(bx+a)}$$

command

```
integrate((d*x+c)**(5/2)/x**3/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.23 Problem number 475

$$\int \frac{(c+dx)^{5/2}}{x^4(a+bx)^2}\,dx$$

Optimal antiderivative

$$-\frac{c(dx+c)^{\frac{3}{2}}}{3a\,x^3\,(bx+a)}-\frac{(-3ad+8bc)\,(-ad+bc)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{dx+c}}{\sqrt{-ad+bc}}\right)\sqrt{b}}{a^5}$$
$$+\frac{(-5a^3d^3+60a^2bc\,d^2-120a\,b^2c^2d+64b^3c^3)\operatorname{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)}{8a^5\sqrt{c}}$$
$$-\frac{b(19a^2d^2-52abcd+32b^2c^2)\,\sqrt{dx+c}}{8a^4\,(bx+a)}+\frac{c(-9ad+8bc)\,\sqrt{dx+c}}{12a^2x^2\,(bx+a)}$$
$$-\frac{(33a^2d^2-82abcd+48b^2c^2)\,\sqrt{dx+c}}{24a^3x\,(bx+a)}$$

command

```
integrate((d*x+c)**(5/2)/x**4/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.24 Problem number 487

$$\int \frac{\sqrt{a+bx}\,(A+Bx)}{x^{11/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A(bx+a)^{\frac{3}{2}}}{9a\,x^{\frac{9}{2}}}+\frac{2(2Ab-3Ba)\,(bx+a)^{\frac{3}{2}}}{21a^2x^{\frac{7}{2}}}-\frac{8b(2Ab-3Ba)\,(bx+a)^{\frac{3}{2}}}{105a^3x^{\frac{5}{2}}}+\frac{16b^2(2Ab-3Ba)\,(bx+a)^{\frac{3}{2}}}{315a^4x^{\frac{3}{2}}}$$

command

```
integrate((B*x+A)*(b*x+a)**(1/2)/x**(11/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{70a^7b^{\frac{19}{2}}\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}-\frac{220a^6b^{\frac{21}{2}}x\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}-\frac{228a^5b^{\frac{23}{2}}x^2\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}-\frac{80a^4b^{\frac{25}{2}}x^3\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}+\frac{10a^3b^{\frac{27}{2}}x^4\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}+\frac{60a^2b^{\frac{29}{2}}x^5\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}+\frac{80ab^{\frac{31}{2}}x^6\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}+\frac{32b^{\frac{33}{2}}x^7\sqrt{\frac{a}{bx}+1}}{315a^7b^9x^4+945a^6b^{10}x^5+945a^5b^{11}x^6+315a^4b^{12}x^7}\right)+B\left(-\frac{30a^5b^{\frac{9}{2}}\sqrt{\frac{a}{bx}+1}}{105a^5b^4x^3+210a^4b^5x^4+105a^3b^6x^5}-\frac{66a^4b^{\frac{11}{2}}x\sqrt{\frac{a}{bx}+1}}{105a^5b^4x^3+210a^4b^5x^4+105a^3b^6x^5}-\frac{34a^3b^{\frac{13}{2}}x^2\sqrt{\frac{a}{bx}+1}}{105a^5b^4x^3+210a^4b^5x^4+105a^3b^6x^5}-\frac{6a^2b^{\frac{15}{2}}x^3\sqrt{\frac{a}{bx}+1}}{105a^5b^4x^3+210a^4b^5x^4+105a^3b^6x^5}-\frac{24ab^{\frac{17}{2}}x^4\sqrt{\frac{a}{bx}+1}}{105a^5b^4x^3+210a^4b^5x^4+105a^3b^6x^5}-\frac{16b^{\frac{19}{2}}x^5\sqrt{\frac{a}{bx}+1}}{105a^5b^4x^3+210a^4b^5x^4+105a^3b^6x^5}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.25 Problem number 498

$$\int \frac{(a+bx)^{3/2}(A+Bx)}{x^{11/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A(bx+a)^{\frac{5}{2}}}{9a\,x^{\frac{9}{2}}}+\frac{2(4Ab-9Ba)\,(bx+a)^{\frac{5}{2}}}{63a^2x^{\frac{7}{2}}}-\frac{4b(4Ab-9Ba)\,(bx+a)^{\frac{5}{2}}}{315a^3x^{\frac{5}{2}}}$$

command

```
integrate((b*x+a)**(3/2)*(B*x+A)/x**(11/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{70a^6b^{\frac{9}{2}}\sqrt{\frac{a}{bx}+1}}{315a^5b^4x^4+630a^4b^5x^5+315a^3b^6x^6}-\frac{240a^5b^{\frac{11}{2}}x\sqrt{\frac{a}{bx}+1}}{315a^5b^4x^4+630a^4b^5x^5+315a^3b^6x^6}\right.$$
$$-\frac{276a^4b^{\frac{13}{2}}x^2\sqrt{\frac{a}{bx}+1}}{315a^5b^4x^4+630a^4b^5x^5+315a^3b^6x^6}-\frac{104a^3b^{\frac{15}{2}}x^3\sqrt{\frac{a}{bx}+1}}{315a^5b^4x^4+630a^4b^5x^5+315a^3b^6x^6}$$
$$-\frac{6a^2b^{\frac{17}{2}}x^4\sqrt{\frac{a}{bx}+1}}{315a^5b^4x^4+630a^4b^5x^5+315a^3b^6x^6}-\frac{24ab^{\frac{19}{2}}x^5\sqrt{\frac{a}{bx}+1}}{315a^5b^4x^4+630a^4b^5x^5+315a^3b^6x^6}$$
$$\left.-\frac{16b^{\frac{21}{2}}x^6\sqrt{\frac{a}{bx}+1}}{315a^5b^4x^4+630a^4b^5x^5+315a^3b^6x^6}\right)$$
$$+B\left(-\frac{2a\sqrt{b}\sqrt{\frac{a}{bx}+1}}{7x^3}-\frac{16b^{\frac{3}{2}}\sqrt{\frac{a}{bx}+1}}{35x^2}-\frac{2b^{\frac{5}{2}}\sqrt{\frac{a}{bx}+1}}{35ax}+\frac{4b^{\frac{7}{2}}\sqrt{\frac{a}{bx}+1}}{35a^2}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.26 Problem number 509

$$\int \frac{(a+bx)^{5/2}(A+Bx)}{x^{11/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A(bx+a)^{\frac{7}{2}}}{9a\,x^{\frac{9}{2}}}+\frac{2(2Ab-9Ba)\,(bx+a)^{\frac{7}{2}}}{63a^2x^{\frac{7}{2}}}$$

command

```
integrate((b*x+a)**(5/2)*(B*x+A)/x**(11/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{2a^2\sqrt{b}\,\sqrt{\frac{a}{bx}+1}}{9x^4}-\frac{38ab^{\frac{3}{2}}\sqrt{\frac{a}{bx}+1}}{63x^3}-\frac{10b^{\frac{5}{2}}\sqrt{\frac{a}{bx}+1}}{21x^2}-\frac{2b^{\frac{7}{2}}\sqrt{\frac{a}{bx}+1}}{63ax}+\frac{4b^{\frac{9}{2}}\sqrt{\frac{a}{bx}+1}}{63a^2}\right)+B\left(-\frac{2a^2\sqrt{b}\,\sqrt{\frac{a}{bx}+1}}{7x^3}-\frac{6ab^{\frac{3}{2}}\sqrt{\frac{a}{bx}+1}}{7x^2}-\frac{6b^{\frac{5}{2}}\sqrt{\frac{a}{bx}+1}}{7x}-\frac{2b^{\frac{7}{2}}\sqrt{\frac{a}{bx}+1}}{7a}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.27 Problem number 524

$$\int \frac{A+Bx}{x^{13/2}\sqrt{a+bx}}\,dx$$

Optimal antiderivative

$$-\frac{2A\sqrt{bx+a}}{11a\,x^{\frac{11}{2}}}+\frac{2(10Ab-11Ba)\,\sqrt{bx+a}}{99a^2x^{\frac{9}{2}}}-\frac{16b(10Ab-11Ba)\,\sqrt{bx+a}}{693a^3x^{\frac{7}{2}}}+\frac{32b^2(10Ab-11Ba)\,\sqrt{bx+a}}{1155a^4x^{\frac{5}{2}}}-\frac{128b^3(10Ab-11Ba)\,\sqrt{bx+a}}{3465a^5x^{\frac{3}{2}}}+\frac{256b^4(10Ab-11Ba)\,\sqrt{bx+a}}{3465a^6\sqrt{x}}$$

command

```
integrate((B*x+A)/x**(13/2)/(b*x+a)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.28 Problem number 527

$$\int \frac{x^{5/2}(A+Bx)}{(a+bx)^{3/2}}\,dx$$

Optimal antiderivative

$$\frac{5a^2(6Ab-7Ba)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{bx+a}}\right)}{8b^{\frac{9}{2}}}+\frac{2(Ab-Ba)\,x^{\frac{7}{2}}}{ab\sqrt{bx+a}}+\frac{5(6Ab-7Ba)\,x^{\frac{3}{2}}\sqrt{bx+a}}{12b^3}-\frac{(6Ab-7Ba)\,x^{\frac{5}{2}}\sqrt{bx+a}}{3a\,b^2}-\frac{5a(6Ab-7Ba)\sqrt{x}\,\sqrt{bx+a}}{8b^4}$$

command

```
integrate(x**(5/2)*(B*x+A)/(b*x+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{15a^{\frac{3}{2}}\sqrt{x}}{4b^3\sqrt{1+\frac{bx}{a}}}-\frac{5\sqrt{a}\,x^{\frac{3}{2}}}{4b^2\sqrt{1+\frac{bx}{a}}}+\frac{15a^2\operatorname{asinh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{4b^{\frac{7}{2}}}+\frac{x^{\frac{5}{2}}}{2\sqrt{a}\,b\sqrt{1+\frac{bx}{a}}}\right)+B\left(\frac{35a^{\frac{5}{2}}\sqrt{x}}{8b^4\sqrt{1+\frac{bx}{a}}}+\frac{35a^{\frac{3}{2}}x^{\frac{3}{2}}}{24b^3\sqrt{1+\frac{bx}{a}}}-\frac{7\sqrt{a}\,x^{\frac{5}{2}}}{12b^2\sqrt{1+\frac{bx}{a}}}-\frac{35a^3\operatorname{asinh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{8b^{\frac{9}{2}}}+\frac{x^{\frac{7}{2}}}{3\sqrt{a}\,b\sqrt{1+\frac{bx}{a}}}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.29 Problem number 534

$$\int \frac{A+Bx}{x^{9/2}(a+bx)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A}{7a\,x^{\frac{7}{2}}\sqrt{bx+a}}-\frac{2(8Ab-7Ba)}{7a^2x^{\frac{5}{2}}\sqrt{bx+a}}+\frac{12(8Ab-7Ba)\sqrt{bx+a}}{35a^3x^{\frac{5}{2}}}-\frac{16b(8Ab-7Ba)\sqrt{bx+a}}{35a^4x^{\frac{3}{2}}}+\frac{32b^2(8Ab-7Ba)\sqrt{bx+a}}{35a^5\sqrt{x}}$$

command

```
integrate((B*x+A)/x**(9/2)/(b*x+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{10a^7b^{\frac{33}{2}}\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}-\frac{14a^6b^{\frac{35}{2}}x\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}-\frac{14a^5b^{\frac{37}{2}}x^2\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}+\frac{70a^4b^{\frac{39}{2}}x^3\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}+\frac{560a^3b^{\frac{41}{2}}x^4\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}+\frac{1120a^2b^{\frac{43}{2}}x^5\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}+\frac{896ab^{\frac{45}{2}}x^6\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}+\frac{256b^{\frac{47}{2}}x^7\sqrt{\frac{a}{bx}+1}}{35a^9b^{16}x^3+140a^8b^{17}x^4+210a^7b^{18}x^5+140a^6b^{19}x^6+35a^5b^{20}x^7}\right)+B\left(-\frac{2a^5b^{\frac{19}{2}}\sqrt{\frac{a}{bx}+1}}{5a^7b^9x^2+15a^6b^{10}x^3+15a^5b^{11}x^4+5a^4b^{12}x^5}-\frac{10a^3b^{\frac{23}{2}}x^2\sqrt{\frac{a}{bx}+1}}{5a^7b^9x^2+15a^6b^{10}x^3+15a^5b^{11}x^4+5a^4b^{12}x^5}-\frac{60a^2b^{\frac{25}{2}}x^3\sqrt{\frac{a}{bx}+1}}{5a^7b^9x^2+15a^6b^{10}x^3+15a^5b^{11}x^4+5a^4b^{12}x^5}-\frac{80ab^{\frac{27}{2}}x^4\sqrt{\frac{a}{bx}+1}}{5a^7b^9x^2+15a^6b^{10}x^3+15a^5b^{11}x^4+5a^4b^{12}x^5}-\frac{32b^{\frac{29}{2}}x^5\sqrt{\frac{a}{bx}+1}}{5a^7b^9x^2+15a^6b^{10}x^3+15a^5b^{11}x^4+5a^4b^{12}x^5}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.30 Problem number 539

$$\int \frac{x^{3/2}(A+Bx)}{(a+bx)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{2(Ab-Ba)\,x^{\frac{5}{2}}}{3ab\,(bx+a)^{\frac{3}{2}}}+\frac{(2Ab-5Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{bx+a}}\right)}{b^{\frac{7}{2}}}+\frac{2(2Ab-5Ba)\,x^{\frac{3}{2}}}{3a\,b^{2}\sqrt{bx+a}}-\frac{(2Ab-5Ba)\,\sqrt{x}\,\sqrt{bx+a}}{a\,b^{3}}$$

command

```
integrate(x**(3/2)*(B*x+A)/(b*x+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(\frac{6a^{\frac{39}{2}}b^{11}x^{\frac{27}{2}}\sqrt{1+\frac{bx}{a}}\,\operatorname{asinh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{3a^{\frac{39}{2}}b^{\frac{27}{2}}x^{\frac{27}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{37}{2}}b^{\frac{29}{2}}x^{\frac{29}{2}}\sqrt{1+\frac{bx}{a}}}+\frac{6a^{\frac{37}{2}}b^{12}x^{\frac{29}{2}}\sqrt{1+\frac{bx}{a}}\,\operatorname{asinh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{3a^{\frac{39}{2}}b^{\frac{27}{2}}x^{\frac{27}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{37}{2}}b^{\frac{29}{2}}x^{\frac{29}{2}}\sqrt{1+\frac{bx}{a}}}-\frac{6a^{19}b^{\frac{23}{2}}x^{14}}{3a^{\frac{39}{2}}b^{\frac{27}{2}}x^{\frac{27}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{37}{2}}b^{\frac{29}{2}}x^{\frac{29}{2}}\sqrt{1+\frac{bx}{a}}}-\frac{8a^{18}b^{\frac{25}{2}}x^{15}}{3a^{\frac{39}{2}}b^{\frac{27}{2}}x^{\frac{27}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{37}{2}}b^{\frac{29}{2}}x^{\frac{29}{2}}\sqrt{1+\frac{bx}{a}}}\right)$$

$$+B\left(-\frac{15a^{\frac{81}{2}}b^{22}x^{\frac{51}{2}}\sqrt{1+\frac{bx}{a}}\,\operatorname{asinh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{3a^{\frac{79}{2}}b^{\frac{51}{2}}x^{\frac{51}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{77}{2}}b^{\frac{53}{2}}x^{\frac{53}{2}}\sqrt{1+\frac{bx}{a}}}-\frac{15a^{\frac{79}{2}}b^{23}x^{\frac{53}{2}}\sqrt{1+\frac{bx}{a}}\,\operatorname{asinh}\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{3a^{\frac{79}{2}}b^{\frac{51}{2}}x^{\frac{51}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{77}{2}}b^{\frac{53}{2}}x^{\frac{53}{2}}\sqrt{1+\frac{bx}{a}}}+\frac{15a^{40}b^{\frac{45}{2}}x^{26}}{3a^{\frac{79}{2}}b^{\frac{51}{2}}x^{\frac{51}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{77}{2}}b^{\frac{53}{2}}x^{\frac{53}{2}}\sqrt{1+\frac{bx}{a}}}+\frac{20a^{39}b^{\frac{47}{2}}x^{27}}{3a^{\frac{79}{2}}b^{\frac{51}{2}}x^{\frac{51}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{77}{2}}b^{\frac{53}{2}}x^{\frac{53}{2}}\sqrt{1+\frac{bx}{a}}}+\frac{3a^{38}b^{\frac{49}{2}}x^{28}}{3a^{\frac{79}{2}}b^{\frac{51}{2}}x^{\frac{51}{2}}\sqrt{1+\frac{bx}{a}}+3a^{\frac{77}{2}}b^{\frac{53}{2}}x^{\frac{53}{2}}\sqrt{1+\frac{bx}{a}}}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.31 Problem number 543

$$\int \frac{A+Bx}{x^{5/2}(a+bx)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A}{3a\,x^{\frac{3}{2}}\,(bx+a)^{\frac{3}{2}}}-\frac{2(2Ab-Ba)}{3a^{2}\,(bx+a)^{\frac{3}{2}}\,\sqrt{x}}-\frac{8(2Ab-Ba)}{3a^{3}\sqrt{x}\,\sqrt{bx+a}}+\frac{16(2Ab-Ba)\sqrt{bx+a}}{3a^{4}\sqrt{x}}$$

command

```
integrate((B*x+A)/x**(5/2)/(b*x+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{2a^{4}b^{\frac{19}{2}}\sqrt{\frac{a}{bx}+1}}{3a^{7}b^{9}x+9a^{6}b^{10}x^{2}+9a^{5}b^{11}x^{3}+3a^{4}b^{12}x^{4}}+\frac{10a^{3}b^{\frac{21}{2}}x\sqrt{\frac{a}{bx}+1}}{3a^{7}b^{9}x+9a^{6}b^{10}x^{2}+9a^{5}b^{11}x^{3}+3a^{4}b^{12}x^{4}}+\frac{60a^{2}b^{\frac{23}{2}}x^{2}\sqrt{\frac{a}{bx}+1}}{3a^{7}b^{9}x+9a^{6}b^{10}x^{2}+9a^{5}b^{11}x^{3}+3a^{4}b^{12}x^{4}}+\frac{80ab^{\frac{25}{2}}x^{3}\sqrt{\frac{a}{bx}+1}}{3a^{7}b^{9}x+9a^{6}b^{10}x^{2}+9a^{5}b^{11}x^{3}+3a^{4}b^{12}x^{4}}+\frac{32b^{\frac{27}{2}}x^{4}\sqrt{\frac{a}{bx}+1}}{3a^{7}b^{9}x+9a^{6}b^{10}x^{2}+9a^{5}b^{11}x^{3}+3a^{4}b^{12}x^{4}}\right)+B\left(-\frac{6a^{2}b^{\frac{9}{2}}\sqrt{\frac{a}{bx}+1}}{3a^{5}b^{4}+6a^{4}b^{5}x+3a^{3}b^{6}x^{2}}-\frac{24ab^{\frac{11}{2}}x\sqrt{\frac{a}{bx}+1}}{3a^{5}b^{4}+6a^{4}b^{5}x+3a^{3}b^{6}x^{2}}-\frac{16b^{\frac{13}{2}}x^{2}\sqrt{\frac{a}{bx}+1}}{3a^{5}b^{4}+6a^{4}b^{5}x+3a^{3}b^{6}x^{2}}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.32 Problem number 578

$$\int \frac{x\sqrt{a+bx}}{\sqrt{c+dx}}\,dx$$

Optimal antiderivative

$$\frac{(-ad+bc)\,(ad+3bc)\,\mathrm{arctanh}\left(\frac{\sqrt{d}\,\sqrt{bx+a}}{\sqrt{b}\,\sqrt{dx+c}}\right)}{4b^{\frac{3}{2}}d^{\frac{5}{2}}} + \frac{(bx+a)^{\frac{3}{2}}\sqrt{dx+c}}{2bd} - \frac{(ad+3bc)\sqrt{bx+a}\,\sqrt{dx+c}}{4b\,d^{2}}$$

command

```
integrate(x*(b*x+a)**(1/2)/(d*x+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.33 Problem number 723

$$\int \frac{x^4(1+x)^{3/2}}{\sqrt{1-x}}\,dx$$

Optimal antiderivative

$$\frac{11\arcsin(x)}{16} - \frac{11\sqrt{1-x}\,(1+x)^{\frac{3}{2}}}{48} - \frac{x^2(1+x)^{\frac{5}{2}}\sqrt{1-x}}{15} - \frac{x^3(1+x)^{\frac{5}{2}}\sqrt{1-x}}{6} - \frac{(1+x)^{\frac{5}{2}}(18+19x)\sqrt{1-x}}{120} - \frac{11\sqrt{1-x}\,\sqrt{1+x}}{16}$$

command

```
integrate(x**4*(1+x)**(3/2)/(1-x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$2\left(\left\{-\frac{x\sqrt{1-x}\,\sqrt{x+1}}{4}-\sqrt{1-x}\,\sqrt{x+1}+\frac{3\operatorname{asin}\left(\frac{\sqrt{2}\,\sqrt{x+1}}{2}\right)}{2}\quad\text{for}\ \sqrt{x+1}>-\sqrt{2}\wedge\sqrt{x+1}<\sqrt{2}\right)\right.$$

$$-8\left(\left\{-\frac{3x\sqrt{1-x}\,\sqrt{x+1}}{4}+\frac{(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{6}-2\sqrt{1-x}\,\sqrt{x+1}+\frac{5\operatorname{asin}\left(\frac{\sqrt{2}\,\sqrt{x+1}}{2}\right)}{2}\quad\text{for}\ \sqrt{x+1}>-\sqrt{2}\wedge\right.\right.$$

$$+12\left(\left\{-\frac{7x\sqrt{1-x}\,\sqrt{x+1}}{4}+\frac{2(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{3}+\frac{\sqrt{1-x}\,\sqrt{x+1}\left(-5x-2(x+1)^3+6(x+1)^2-4\right)}{16}-4\sqrt{1-x}\,\sqrt{x+1}+\frac{35}{}\right.\right.$$

$$-8\left(\left\{-\frac{15x\sqrt{1-x}\,\sqrt{x+1}}{4}-\frac{(1-x)^{\frac{5}{2}}(x+1)^{\frac{5}{2}}}{10}+2(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}+\frac{5\sqrt{1-x}\,\sqrt{x+1}\left(-5x-2(x+1)^3+6(x+1)^2-4\right)}{16}-8\right.\right.$$

$$+2\left(\left\{\frac{x^3(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{12}-\frac{31x\sqrt{1-x}\,\sqrt{x+1}}{4}-\frac{3(1-x)^{\frac{5}{2}}(x+1)^{\frac{5}{2}}}{5}+\frac{16(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{3}+\frac{33\sqrt{1-x}\,\sqrt{x+1}\left(-5x-2(x+1)^3+6\right.}{32}\right.\right.$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.34 Problem number 724

$$\int\frac{x^3(1+x)^{3/2}}{\sqrt{1-x}}\,dx$$

Optimal antiderivative

$$\frac{3\arcsin(x)}{4}-\frac{\sqrt{1-x}\,(1+x)^{\frac{3}{2}}}{4}-\frac{\sqrt{1-x}\,(1+x)^{\frac{5}{2}}}{10}-\frac{x^2(1+x)^{\frac{5}{2}}\sqrt{1-x}}{5}-\frac{(1+x)^{\frac{7}{2}}\sqrt{1-x}}{10}-\frac{3\sqrt{1-x}\,\sqrt{1+x}}{4}$$

command

```
integrate(x**3*(1+x)**(3/2)/(1-x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-2\left(\left\{-\frac{x\sqrt{1-x}\,\sqrt{x+1}}{4}-\sqrt{1-x}\,\sqrt{x+1}+\frac{3\operatorname{asin}\left(\frac{\sqrt{2}\,\sqrt{x+1}}{2}\right)}{2}\quad\text{for}\ \sqrt{x+1}>-\sqrt{2}\wedge\sqrt{x+1}<\sqrt{2}\right)\right.$$

$$+6\left(\left\{-\frac{3x\sqrt{1-x}\,\sqrt{x+1}}{4}+\frac{(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{6}-2\sqrt{1-x}\,\sqrt{x+1}+\frac{5\operatorname{asin}\left(\frac{\sqrt{2}\,\sqrt{x+1}}{2}\right)}{2}\quad\text{for}\ \sqrt{x+1}>-\sqrt{2}\wedge\right.\right.$$

$$-6\left(\left\{-\frac{7x\sqrt{1-x}\,\sqrt{x+1}}{4}+\frac{2(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{3}+\frac{\sqrt{1-x}\,\sqrt{x+1}\left(-5x-2(x+1)^3+6(x+1)^2-4\right)}{16}-4\sqrt{1-x}\,\sqrt{x+1}+\frac{35}{}\right.\right.$$

$$+2\left(\left\{-\frac{15x\sqrt{1-x}\,\sqrt{x+1}}{4}-\frac{(1-x)^{\frac{5}{2}}(x+1)^{\frac{5}{2}}}{10}+2(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}+\frac{5\sqrt{1-x}\,\sqrt{x+1}\left(-5x-2(x+1)^3+6(x+1)^2-4\right)}{16}-8\right.\right.$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.35 Problem number 827

$$\int x^{-m}(-a-bx)^{-n}(a+bx)^n\,dx$$

Optimal antiderivative

$$\frac{x^{1-m}(bx+a)^n\,(-bx-a)^{-n}}{1-m}$$

command

```
integrate((b*x+a)**n/(x**m)/((-b*x-a)**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x(a+bx)^n}{mx^m(-a-bx)^n-x^m(-a-bx)^n} & \text{for } m\neq 1 \\ \begin{cases} e^{-i\pi n}\log\left(-1+\frac{b\left(\frac{a}{b}+x\right)}{a}\right) & \text{for } \left|\frac{b\left(\frac{a}{b}+x\right)}{a}\right|>1 \\ e^{-i\pi n}\log\left(1-\frac{b\left(\frac{a}{b}+x\right)}{a}\right) & \text{otherwise} \end{cases} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.36 Problem number 948

$$\int (bx)^{5/2}(c+dx)^n(e+fx)^2\,dx$$

Optimal antiderivative

$$-\frac{2f(9cf-de(13+2n))\,(bx)^{\frac{7}{2}}\,(dx+c)^{1+n}}{b\,d^2\,(9+2n)\,(11+2n)}+\frac{2f\,(bx)^{\frac{7}{2}}\,(dx+c)^{1+n}\,(fx+e)}{bd\,(11+2n)}$$
$$+\frac{2\big(63c^2f^2-14cdef(11+2n)+d^2e^2\left(4n^2+40n+99\right)\big)\,(bx)^{\frac{7}{2}}\,(dx+c)^n\,\mathrm{hypergeom}\left(\left[\frac{7}{2},-n\right],\left[\frac{9}{2}\right],-\frac{dx}{c}\right)\left(1+\frac{dx}{c}\right)^{-}}{7b\,d^2\,(9+2n)\,(11+2n)}$$

command

```
integrate((b*x)**(5/2)*(d*x+c)**n*(f*x+e)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2b^{\frac{5}{2}}c^{n}e^{2}x^{\frac{7}{2}}{}_{2}F_{1}\left(\begin{matrix}\frac{7}{2},-n\\\frac{9}{2}\end{matrix}\middle|\frac{dxe^{i\pi}}{c}\right)}{7}+\frac{4b^{\frac{5}{2}}c^{n}efx^{\frac{9}{2}}{}_{2}F_{1}\left(\begin{matrix}\frac{9}{2},-n\\\frac{11}{2}\end{matrix}\middle|\frac{dxe^{i\pi}}{c}\right)}{9}+\frac{2b^{\frac{5}{2}}c^{n}f^{2}x^{\frac{11}{2}}{}_{2}F_{1}\left(\begin{matrix}\frac{11}{2},-n\\\frac{13}{2}\end{matrix}\middle|\frac{dxe^{i\pi}}{c}\right)}{11}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.37 Problem number 990

$$\int x^{m}(3-2ax)^{2+n}(6+4ax)^{n}\,dx$$

Optimal antiderivative

$$\frac{2^{n}9^{1+n}x^{1+m}\,\mathrm{hypergeom}\left(\left[-n,\frac{1}{2}+\frac{m}{2}\right],\left[\frac{3}{2}+\frac{m}{2}\right],\frac{4a^{2}x^{2}}{9}\right)}{1+m}-\frac{2^{2+n}3^{1+2n}a\,x^{2+m}\,\mathrm{hypergeom}\left(\left[-n,1+\frac{m}{2}\right],\left[2+\frac{m}{2}\right],\frac{4a^{2}x^{2}}{9}\right)}{2+m}+\frac{2^{2+n}9^{n}a^{2}x^{3+m}\,\mathrm{hypergeom}\left(\left[-n,\frac{3}{2}+\frac{m}{2}\right],\left[\frac{5}{2}+\frac{m}{2}\right],\frac{4a^{2}x^{2}}{9}\right)}{3+m}$$

command

```
integrate(x**m*(-2*a*x+3)**(2+n)*(4*a*x+6)**n,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.38 Problem number 991

$$\int x^{m}(3-2ax)^{1+n}(6+4ax)^{n}\,dx$$

Optimal antiderivative

$$\frac{2^{n} 3^{1+2 n} x^{1+m} \operatorname{hypergeom}\left(\left[-n, \frac{1}{2}+\frac{m}{2}\right],\left[\frac{3}{2}+\frac{m}{2}\right], \frac{4 a^{2} x^{2}}{9}\right)}{1+m}-\frac{2^{1+n} 9^{n} a\, x^{2+m} \operatorname{hypergeom}\left(\left[-n, 1+\frac{m}{2}\right],\left[2+\frac{m}{2}\right], \frac{4 a^{2} x^{2}}{9}\right)}{2+m}$$

command

```
integrate(x**m*(-2*a*x+3)**(1+n)*(4*a*x+6)**n,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{9 \cdot 18^{n} 4^{-\frac{m}{2}} \cdot 9^{\frac{m}{2}} a^{-m} G_{6,6}^{5,3}\left(\begin{matrix} -\frac{m}{2}-\frac{n}{2}, -\frac{m}{2}-\frac{n}{2}+\frac{1}{2}, 1 & \frac{1}{2}-\frac{m}{2}, -\frac{m}{2}-n, -\frac{m}{2}-n \\ -\frac{m}{2}-n-\frac{1}{2}, -\frac{m}{2}-n, -\frac{m}{2}-\frac{n}{2}, -\frac{m}{2}-n+\frac{1}{2}, -\frac{m}{2}-\frac{n}{2}+\frac{1}{2} & 0 \end{matrix}\right.}{8 \pi a \Gamma(-n)}$$
$$+\frac{9 \cdot 18^{n} 4^{-\frac{m}{2}} \cdot 9^{\frac{m}{2}} a^{-m} G_{6,6}^{5,3}\left(\begin{matrix} -\frac{m}{2}-\frac{n}{2}-\frac{1}{2}, -\frac{m}{2}-\frac{n}{2}, 1 & -\frac{m}{2}, -\frac{m}{2}-n-\frac{1}{2}, -\frac{m}{2}- \\ -\frac{m}{2}-n-1, -\frac{m}{2}-n-\frac{1}{2}, -\frac{m}{2}-\frac{n}{2}-\frac{1}{2}, -\frac{m}{2}-n, -\frac{m}{2}-\frac{n}{2} & 0 \end{matrix}\right.}{8 \pi a \Gamma(-n)}$$
$$+\frac{9 \cdot 18^{n} 4^{-\frac{m}{2}} \cdot 9^{\frac{m}{2}} a^{-m} G_{6,6}^{2,6}\left(\begin{matrix} -\frac{m}{2}-1, -\frac{m}{2}-\frac{1}{2}, -\frac{m}{2}, -\frac{m}{2}-\frac{n}{2}-1, -\frac{m}{2}-\frac{n}{2}-\frac{1}{2}, 1 & \\ -\frac{m}{2}-\frac{n}{2}-1, -\frac{m}{2}-\frac{n}{2}-\frac{1}{2} & -\frac{m}{2}-1, -\frac{m}{2}-\frac{1}{2}, -\frac{m}{2}-n-1, 0 \end{matrix}\right.}{8 \pi a \Gamma(-n)}$$
$$+\frac{9 \cdot 18^{n} 4^{-\frac{m}{2}} \cdot 9^{\frac{m}{2}} a^{-m} G_{6,6}^{2,6}\left(\begin{matrix} -\frac{m}{2}-\frac{1}{2}, -\frac{m}{2}, \frac{1}{2}-\frac{m}{2}, -\frac{m}{2}-\frac{n}{2}-\frac{1}{2}, -\frac{m}{2}-\frac{n}{2}, 1 & \\ -\frac{m}{2}-\frac{n}{2}-\frac{1}{2}, -\frac{m}{2}-\frac{n}{2} & -\frac{m}{2}-\frac{1}{2}, -\frac{m}{2}, -\frac{m}{2}-n-\frac{1}{2}, 0 \end{matrix}\middle| \frac{9 e^{-2 i \pi}}{4 a^{2} x^{2}}\right)}{8 \pi a \Gamma(-n)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.39 Problem number 1717

$$\int \frac{(c+d x)^{3/2}}{(a+b x)^{2}(e+f x)}\, dx$$

Optimal antiderivative

$$-\frac{(-a d f-2 b c f+3 b d e) \operatorname{arctanh}\left(\frac{\sqrt{b}\, \sqrt{d x+c}}{\sqrt{-a d+b c}}\right) \sqrt{-a d+b c}}{b^{\frac{3}{2}}\,(-a f+b e)^{2}}+\frac{2(-c f+d e)^{\frac{3}{2}} \arctan\left(\frac{\sqrt{f}\, \sqrt{d x+c}}{\sqrt{-c f+d e}}\right)}{(-a f+b e)^{2} \sqrt{f}}-\frac{(-a d+b c) \sqrt{d x+c}}{b\,(-a f+b e)\,(b x+a)}$$

command

```
integrate((d*x+c)**(3/2)/(b*x+a)**2/(f*x+e),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.40 Problem number 1752

$$\int \frac{(A+Bx)(d+ex)^{3/2}}{(a+bx)^2}\,dx$$

Optimal antiderivative

$$\frac{(3Abe-5Bae+2Bbd)(ex+d)^{\frac{3}{2}}}{3b^2(-ae+bd)}-\frac{(Ab-Ba)(ex+d)^{\frac{5}{2}}}{b(-ae+bd)(bx+a)}-\frac{(3Abe-5Bae+2Bbd)\,\mathrm{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)\sqrt{-ae+bd}}{b^{\frac{7}{2}}}+\frac{(3Abe-5Bae+2Bbd)\sqrt{ex+d}}{b^3}$$

command

```
integrate((B*x+A)*(e*x+d)**(3/2)/(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.41 Problem number 1780

$$\int \frac{(a+bx)^2}{(c+dx)(e+fx)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2(-af+be)^2}{5f^2(-cf+de)(fx+e)^{\frac{5}{2}}}-\frac{2(-af+be)(adf-2bcf+bde)}{3f^2(-cf+de)^2(fx+e)^{\frac{3}{2}}}-\frac{2(-ad+bc)^2\,\mathrm{arctanh}\left(\frac{\sqrt{d}\,\sqrt{fx+e}}{\sqrt{-cf+de}}\right)\sqrt{d}}{(-cf+de)^{\frac{7}{2}}}+\frac{2(-ad+bc)^2}{(-cf+de)^3\sqrt{fx+e}}$$

command

```
integrate((b*x+a)**2/(d*x+c)/(f*x+e)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2(ad-bc)^2}{\sqrt{e+fx}\,(cf-de)^3}-\frac{2(ad-bc)^2\operatorname{atan}\left(\frac{\sqrt{e+fx}}{\sqrt{\frac{cf-de}{d}}}\right)}{\sqrt{\frac{cf-de}{d}}\,(cf-de)^3}+\frac{2(af-be)\,(adf-2bcf+bde)}{3f^2\,(e+fx)^{\frac{3}{2}}\,(cf-de)^2}-\frac{2(af-be)^2}{5f^2\,(e+fx)^{\frac{5}{2}}\,(cf-de)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.42 Problem number 1781

$$\int\frac{(a+bx)^2}{(c+dx)(e+fx)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{2(-af+be)^2}{7f^2\,(-cf+de)\,(fx+e)^{\frac{7}{2}}}-\frac{2(-af+be)\,(adf-2bcf+bde)}{5f^2\,(-cf+de)^2\,(fx+e)^{\frac{5}{2}}}+\frac{2(-ad+bc)^2}{3\,(-cf+de)^3\,(fx+e)^{\frac{3}{2}}}-\frac{2d^{\frac{3}{2}}(-ad+bc)^2\operatorname{arctanh}\left(\frac{\sqrt{d}\,\sqrt{fx+e}}{\sqrt{-cf+de}}\right)}{(-cf+de)^{\frac{9}{2}}}+\frac{2d(-ad+bc)^2}{(-cf+de)^4\,\sqrt{fx+e}}$$

command

```
integrate((b*x+a)**2/(d*x+c)/(f*x+e)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2d(ad-bc)^2}{\sqrt{e+fx}\,(cf-de)^4}+\frac{2d(ad-bc)^2\operatorname{atan}\left(\frac{\sqrt{e+fx}}{\sqrt{\frac{cf-de}{d}}}\right)}{\sqrt{\frac{cf-de}{d}}\,(cf-de)^4}-\frac{2(ad-bc)^2}{3\,(e+fx)^{\frac{3}{2}}\,(cf-de)^3}+\frac{2(af-be)\,(adf-2bcf+bde)}{5f^2\,(e+fx)^{\frac{5}{2}}\,(cf-de)^2}-\frac{2(af-be)^2}{7f^2\,(e+fx)^{\frac{7}{2}}\,(cf-de)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.43 Problem number 1782

$$\int \frac{(a+bx)^3(e+fx)^{5/2}}{c+dx}\,dx$$

Optimal antiderivative

$$-\frac{2(-ad+bc)^3\,(-cf+de)\,(fx+e)^{\frac{3}{2}}}{3d^5}-\frac{2(-ad+bc)^3\,(fx+e)^{\frac{5}{2}}}{5d^4}$$
$$+\frac{2b\left(3a^2d^2f^2-3abdf(cf+de)+b^2\left(c^2f^2+cdef+d^2e^2\right)\right)(fx+e)^{\frac{7}{2}}}{7d^3f^3}$$
$$-\frac{2b^2(-3adf+bcf+2bde)\,(fx+e)^{\frac{9}{2}}}{9d^2f^3}+\frac{2b^3(fx+e)^{\frac{11}{2}}}{11d\,f^3}$$
$$+\frac{2(-ad+bc)^3\,(-cf+de)^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{d}\,\sqrt{fx+e}}{\sqrt{-cf+de}}\right)}{d^{\frac{13}{2}}}$$
$$-\frac{2(-ad+bc)^3\,(-cf+de)^2\,\sqrt{fx+e}}{d^6}$$

command

```
integrate((b*x+a)**3*(f*x+e)**(5/2)/(d*x+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2b^3(e+fx)^{\frac{11}{2}}}{11df^3}+\frac{(e+fx)^{\frac{9}{2}}\cdot\left(6ab^2df-2b^3cf-4b^3de\right)}{9d^2f^3}$$
$$+\frac{(e+fx)^{\frac{7}{2}}\cdot\left(6a^2bd^2f^2-6ab^2cdf^2-6ab^2d^2ef+2b^3c^2f^2+2b^3cdef+2b^3d^2e^2\right)}{7d^3f^3}$$
$$+\frac{(e+fx)^{\frac{5}{2}}\cdot\left(2a^3d^3-6a^2bcd^2+6ab^2c^2d-2b^3c^3\right)}{5d^4}$$
$$+\frac{(e+fx)^{\frac{3}{2}}\left(-2a^3cd^3f+2a^3d^4e+6a^2bc^2d^2f-6a^2bcd^3e-6ab^2c^3df+6ab^2c^2d^2e+2b^3c^4f-2b^3c^3de\right)}{3d^5}$$
$$+\frac{\sqrt{e+fx}\left(2a^3c^2d^3f^2-4a^3cd^4ef+2a^3d^5e^2-6a^2bc^3d^2f^2+12a^2bc^2d^3ef-6a^2bcd^4e^2+6ab^2c^4df^2-12ab^2c^3d^2e\right.}{d^6}$$
$$-\frac{2(ad-bc)^3\,(cf-de)^3\operatorname{atan}\left(\frac{\sqrt{e+fx}}{\sqrt{\frac{cf-de}{d}}}\right)}{d^7\sqrt{\frac{cf-de}{d}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.44 Problem number 1788

$$\int \frac{(a+bx)^3}{(c+dx)(e+fx)^{7/2}}\,dx$$

Optimal antiderivative

$$-\frac{2(-af+be)^3}{5f^3(-cf+de)(fx+e)^{\frac{5}{2}}}+\frac{2(-af+be)^2(adf-3bcf+2bde)}{3f^3(-cf+de)^2(fx+e)^{\frac{3}{2}}}+\frac{2(-ad+bc)^3\,\mathrm{arctanh}\left(\frac{\sqrt{d}\,\sqrt{fx+e}}{\sqrt{-cf+de}}\right)}{(-cf+de)^{\frac{7}{2}}\sqrt{d}}-\frac{2(-af+be)\left(a^2d^2f^2+abdf(-3cf+de)+b^2(3c^2f^2-3cdef+d^2e^2)\right)}{f^3(-cf+de)^3\sqrt{fx+e}}$$

command

```
integrate((b*x+a)**3/(d*x+c)/(f*x+e)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2(af-be)\left(a^2d^2f^2-3abcdf^2+abd^2ef+3b^2c^2f^2-3b^2cdef+b^2d^2e^2\right)}{f^3\sqrt{e+fx}\,(cf-de)^3}+\frac{2(af-be)^2(adf-3bcf+2bde)}{3f^3(e+fx)^{\frac{3}{2}}(cf-de)^2}-\frac{2(af-be)^3}{5f^3(e+fx)^{\frac{5}{2}}(cf-de)}-\frac{2(ad-bc)^3\,\mathrm{atan}\left(\frac{\sqrt{e+fx}}{\sqrt{\frac{cf-de}{d}}}\right)}{d\sqrt{\frac{cf-de}{d}}\,(cf-de)^3}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.45 Problem number 1799

$$\int \frac{\sqrt{1-2x}\,(3+5x)}{(2+3x)^3}\,dx$$

Optimal antiderivative

$$\frac{(1-2x)^{\frac{3}{2}}}{42\,(2+3x)^2}+\frac{23\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{441}-\frac{23\sqrt{1-2x}}{42\,(2+3x)}$$

command

```
integrate((3+5*x)*(1-2*x)**(1/2)/(2+3*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{148\left(\begin{cases}\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147} & \text{fo}\end{cases}}{9}$$

$$-\frac{56\left(\begin{cases}\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^2}+\cdots\right.}{1029}\end{cases}}{9}$$

$$-\frac{20\left(\begin{cases}-\frac{\sqrt{21}\,\mathrm{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\,\mathrm{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)}{9}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.46 Problem number 1800

$$\int \frac{\sqrt{1-2x}\,(3+5x)}{(2+3x)^4}\,dx$$

Optimal antiderivative

$$\frac{(1-2x)^{\frac{3}{2}}}{63\,(2+3x)^3}+\frac{34\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{9261}-\frac{17\sqrt{1-2x}}{63\,(2+3x)^2}+\frac{17\sqrt{1-2x}}{441\,(2+3x)}$$

command

```
integrate((3+5*x)*(1-2*x)**(1/2)/(2+3*x)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{40\left(\left\{\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}\right)}{147}\quad \text{for } \cdots\right.\right.}{9}$$

$$+\frac{296\left(\left\{\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)^2}+\cdots\right.}{1029}\right.\right.}{9}$$

$$+\frac{112\left(\left\{\frac{\sqrt{21}\left(-\frac{5\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}{32}+\frac{5\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}{32}-\frac{5}{32\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}-\frac{1}{16\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)^2}-\cdots\right.}{7203}\right.\right.}{\cdots}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.47 Problem number 1810

$$\int \frac{\sqrt{1-2x}\,(3+5x)^2}{(2+3x)^3}\,dx$$

Optimal antiderivative

$$-\frac{(1-2x)^{\frac{3}{2}}}{126\,(2+3x)^2}+\frac{139(1-2x)^{\frac{3}{2}}}{882\,(2+3x)}-\frac{863\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{1323}+\frac{863\sqrt{1-2x}}{441}$$

command

```
integrate((3+5*x)**2*(1-2*x)**(1/2)/(2+3*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{50\sqrt{1-2x}}{27}$$
$$+\frac{32\left(\begin{cases}\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147} & \text{for}\end{cases}\right.}{3}$$
$$+\frac{56\left(\begin{cases}\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^2}+\frac{}{16}\right.}{1029}\end{cases}\right.}{27}$$
$$+\frac{130\left(\begin{cases}-\frac{\sqrt{21}\,\mathrm{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\,\mathrm{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)}{9}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.48 Problem number 1822

$$\int \frac{\sqrt{1-2x}\,(3+5x)^3}{(2+3x)^3}\,dx$$

Optimal antiderivative

$$\frac{7559\operatorname{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{11907}-\frac{53(3+5x)^2\sqrt{1-2x}}{63\,(2+3x)}-\frac{(3+5x)^3\sqrt{1-2x}}{6\,(2+3x)^2}+\frac{5(323+2815x)\sqrt{1-2x}}{1134}$$

command

```
integrate((3+5*x)**3*(1-2*x)**(1/2)/(2+3*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{125(1-2x)^{\frac{3}{2}}}{81}-\frac{50\sqrt{1-2x}}{27}$$
$$-\frac{428\left(\begin{cases}\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147} & \text{fo}\end{cases}\right.}{81}$$
$$-\frac{56\left(\begin{cases}\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^2}+\cdots\right.}{1029}\end{cases}\right.}{81}$$
$$-\frac{370\left(\begin{cases}-\frac{\sqrt{21}\operatorname{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\operatorname{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)}{27}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.49 Problem number 1836

$$\int \frac{\sqrt{1-2x}}{(2+3x)^4(3+5x)}\,dx$$

Optimal antiderivative

$$\frac{83264\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{1029}-50\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}+\frac{\sqrt{1-2x}}{3\,(2+3x)^3}+\frac{52\sqrt{1-2x}}{21\,(2+3x)^2}+\frac{1207\sqrt{1-2x}}{49\,(2+3x)}$$

command

```
integrate((1-2*x)**(1/2)/(2+3*x)**4/(3+5*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$660\left(\begin{cases}\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147} & \text{for}\end{cases}\right.$$

$$-264\left(\begin{cases}\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^2}+\right.}{1029}\end{cases}\right.$$

$$+112\left(\begin{cases}\frac{\sqrt{21}\left(-\frac{5\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{32}+\frac{5\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{32}-\frac{5}{32\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^2}-\right.}{7203}\end{cases}\right.$$

$$-1650\left(\begin{cases}-\frac{\sqrt{21}\,\mathrm{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for}\ x<-\frac{2}{3}\\ -\frac{\sqrt{21}\,\mathrm{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for}\ x>-\frac{2}{3}\end{cases}\right)$$

$$+2750\left(\begin{cases}-\frac{\sqrt{55}\,\mathrm{acoth}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for}\ x<-\frac{3}{5}\\ -\frac{\sqrt{55}\,\mathrm{atanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for}\ x>-\frac{3}{5}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.50 Problem number 1837

$$\int \frac{\sqrt{1-2x}}{(2+3x)^5(3+5x)}\,dx$$

Optimal antiderivative

$$\frac{11656955\,\text{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{28812} - 250\,\text{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55} + \frac{\sqrt{1-2x}}{4\,(2+3x)^4} + \frac{139\sqrt{1-2x}}{84\,(2+3x)^3} + \frac{14555\sqrt{1-2x}}{1176\,(2+3x)^2} + \frac{337955\sqrt{1-2x}}{2744\,(2+3x)}$$

command

```
integrate((1-2*x)**(1/2)/(2+3*x)**5/(3+5*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.51 Problem number 1838

$$\int \frac{\sqrt{1-2x}\,(2+3x)^5}{(3+5x)^2}\,dx$$

Optimal antiderivative

$$-\frac{328\,\text{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{859375} - \frac{172(2+3x)^2\sqrt{1-2x}}{3125} + \frac{64(2+3x)^3\sqrt{1-2x}}{2625} + \frac{11(2+3x)^4\sqrt{1-2x}}{75} - \frac{(2+3x)^5\sqrt{1-2x}}{5\,(3+5x)} - \frac{4(10998+3625x)\sqrt{1-2x}}{15625}$$

command

```
integrate((2+3*x)**5*(1-2*x)**(1/2)/(3+5*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{27(1-2x)^{\frac{9}{2}}}{200} - \frac{8829(1-2x)^{\frac{7}{2}}}{7000} + \frac{107109(1-2x)^{\frac{5}{2}}}{25000} - \frac{144681(1-2x)^{\frac{3}{2}}}{25000} + \frac{6\sqrt{1-2x}}{3125}$$
$$- \frac{44\left(\begin{cases} \frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}{4} + \frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}{4} - \frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)} - \frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}\right)}{605} & \text{fo} \end{cases}\right)}{15625}$$
$$+ \frac{326\left(\begin{cases} -\frac{\sqrt{55}\operatorname{acoth}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x < -\frac{3}{5} \\ -\frac{\sqrt{55}\operatorname{atanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x > -\frac{3}{5} \end{cases}\right)}{15625}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.52 Problem number 1846

$$\int \frac{\sqrt{1-2x}}{(2+3x)^3(3+5x)^2}\,dx$$

Optimal antiderivative

$$-\frac{7209\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{49} + \frac{1000\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{11}$$
$$-\frac{1045\sqrt{1-2x}}{14\,(3+5x)} + \frac{\sqrt{1-2x}}{2\,(2+3x)^2\,(3+5x)} + \frac{52\sqrt{1-2x}}{7\,(2+3x)\,(3+5x)}$$

command

```
integrate((1-2*x)**(1/2)/(2+3*x)**3/(3+5*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-816\left(\left\{\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}\right)}{147}\quad \text{fo}\right.\right.$$

$$+168\left(\left\{\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)^2}+\cdots\right.}{1029}\right.\right.$$

$$-1100\left(\left\{\frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}-\frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}\right)}{605}\right.\right.$$

$$+3030\left(\begin{cases}-\frac{\sqrt{21}\operatorname{acoth}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\operatorname{atanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)$$

$$-5050\left(\begin{cases}-\frac{\sqrt{55}\operatorname{acoth}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for } x<-\frac{3}{5}\\ -\frac{\sqrt{55}\operatorname{atanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for } x>-\frac{3}{5}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.53 Problem number 1847

$$\int \frac{\sqrt{1-2x}}{(2+3x)^4(3+5x)^2}\,dx$$

Optimal antiderivative

$$-\frac{335579\operatorname{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{343}+\frac{6650\operatorname{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{11}$$
$$-\frac{48645\sqrt{1-2x}}{98\,(3+5x)}+\frac{\sqrt{1-2x}}{3\,(2+3x)^3\,(3+5x)}+\frac{139\sqrt{1-2x}}{42\,(2+3x)^2\,(3+5x)}+\frac{7261\sqrt{1-2x}}{147\,(2+3x)\,(3+5x)}$$

command

```
integrate((1-2*x)**(1/2)/(2+3*x)**4/(3+5*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-6060\left(\left\{\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147}\right.\right.$$

$$+1632\left(\left\{\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^2}+\right.}{1029}\right.\right.$$

$$-336\left(\left\{\frac{\sqrt{21}\left(-\frac{5\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{32}+\frac{5\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{32}-\frac{5}{32\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^2}-\right.}{7203}\right.\right.$$

$$-5500\left(\left\{\frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}\right)}{605}\right.\right.$$

$$+20100\left(\begin{cases}-\frac{\sqrt{21}\operatorname{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for}\ x<-\frac{2}{3}\\ -\frac{\sqrt{21}\operatorname{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for}\ x>-\frac{2}{3}\end{cases}\right)$$

$$-33500\left(\begin{cases}-\frac{\sqrt{55}\operatorname{acoth}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for}\ x<-\frac{3}{5}\\ -\frac{\sqrt{55}\operatorname{atanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for}\ x>-\frac{3}{5}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.54 Problem number 1850

$$\int \frac{\sqrt{1-2x}\,(2+3x)^2}{(3+5x)^3}\,dx$$

Optimal antiderivative

$$-\frac{(1-2x)^{\frac{3}{2}}}{550\,(3+5x)^2}-\frac{133(1-2x)^{\frac{3}{2}}}{6050\,(3+5x)}-\frac{409\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{15125}+\frac{409\sqrt{1-2x}}{3025}$$

command

```
integrate((2+3*x)**2*(1-2*x)**(1/2)/(3+5*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{18\sqrt{1-2x}}{125}-\frac{256\left(\left\{\frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}-\frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}\right)}{605}\quad \mathrm{fo}\right.\right.}{125}$$

$$+\frac{88\left(\left\{\frac{\sqrt{55}\cdot\left(\frac{3\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}+\frac{1}{16\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)^2}+\frac{}{16}\right.}{6655}\right.\right.}{125}$$

$$+\frac{174\left(\begin{cases}-\frac{\sqrt{55}\,\mathrm{acoth}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for } x<-\frac{3}{5}\\ -\frac{\sqrt{55}\,\mathrm{atanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for } x>-\frac{3}{5}\end{cases}\right)}{125}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.55 Problem number 1851

$$\int \frac{\sqrt{1-2x}\,(2+3x)}{(3+5x)^3}\,dx$$

Optimal antiderivative

$$-\frac{(1-2x)^{\frac{3}{2}}}{110\,(3+5x)^2}+\frac{67\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{15125}-\frac{67\sqrt{1-2x}}{550\,(3+5x)}$$

command

```
integrate((2+3*x)*(1-2*x)**(1/2)/(3+5*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{124\left(\begin{cases}\frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}\right)}{605} & \text{fo}\end{cases}\right.}{25}$$

$$+\frac{88\left(\begin{cases}\frac{\sqrt{55}\cdot\left(\frac{3\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}+\frac{1}{16\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)^2}+\frac{}{16}\right.}{6655}\end{cases}\right.}{25}$$

$$-\frac{12\left(\begin{cases}-\frac{\sqrt{55}\,\mathrm{acoth}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x<-\frac{3}{5}\\ -\frac{\sqrt{55}\,\mathrm{atanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x>-\frac{3}{5}\end{cases}\right)}{25}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.56 Problem number 1854

$$\int \frac{\sqrt{1-2x}}{(2+3x)^2(3+5x)^3}\,dx$$

Optimal antiderivative

$$\frac{624\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{7} - \frac{6665\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{121} - \frac{15\sqrt{1-2x}}{2\,(3+5x)^2} + \frac{\sqrt{1-2x}}{(2+3x)\,(3+5x)^2} + \frac{995\sqrt{1-2x}}{22\,(3+5x)}$$

command

```
integrate((1-2*x)**(1/2)/(2+3*x)**2/(3+5*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$252\left(\begin{cases} \frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}{4} + \frac{\log\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)}{4} - \frac{1}{4\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}+1\right)} - \frac{1}{4\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}-1\right)}\right)}{147} & \text{for} \end{cases}\right.$$
$$+1360\left(\begin{cases} \frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}{4} + \frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}{4} - \frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)} - \frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}\right)}{605} & \text{f} \end{cases}\right.$$
$$+440\left(\begin{cases} \frac{\sqrt{55}\cdot\left(\frac{3\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}{16} - \frac{3\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}{16} + \frac{3}{16\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)} + \frac{1}{16\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)^2} + \cdots\right.}{6655} \end{cases}\right.$$
$$-1854\left(\begin{cases} -\frac{\sqrt{21}\,\mathrm{acoth}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)}{21} & \text{for}\ x < -\frac{2}{3} \\ -\frac{\sqrt{21}\,\mathrm{atanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)}{21} & \text{for}\ x > -\frac{2}{3} \end{cases}\right)$$
$$+3090\left(\begin{cases} -\frac{\sqrt{55}\,\mathrm{acoth}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for}\ x < -\frac{3}{5} \\ -\frac{\sqrt{55}\,\mathrm{atanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for}\ x > -\frac{3}{5} \end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.57 Problem number 1855

$$\int \frac{\sqrt{1-2x}}{(2+3x)^3(3+5x)^3}\,dx$$

Optimal antiderivative

$$\frac{43467\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{49}-\frac{66325\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{121}$$
$$-\frac{1045\sqrt{1-2x}}{14\,(3+5x)^2}+\frac{\sqrt{1-2x}}{2\,(2+3x)^2\,(3+5x)^2}+\frac{139\sqrt{1-2x}}{14\,(2+3x)\,(3+5x)^2}+\frac{34655\sqrt{1-2x}}{77\,(3+5x)}$$

command

```
integrate((1-2*x)**(1/2)/(2+3*x)**3/(3+5*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$3708\left(\left\{\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147}\quad \text{fo}\right.\right.$$

$$-504\left(\left\{\frac{\sqrt{21}\cdot\left(\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}+\frac{1}{16\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)^{2}}+\right.}{1029}\right.\right.$$

$$+10100\left(\left\{\frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}\right)}{605}\right.\right.$$

$$+2200\left(\left\{\frac{\sqrt{55}\cdot\left(\frac{3\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}+\frac{1}{16\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)^{2}}+\right.}{6655}\right.\right.$$

$$-18360\left(\begin{cases}-\frac{\sqrt{21}\operatorname{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\operatorname{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)$$

$$+30600\left(\begin{cases}-\frac{\sqrt{55}\operatorname{acoth}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x<-\frac{3}{5}\\ -\frac{\sqrt{55}\operatorname{atanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x>-\frac{3}{5}\end{cases}\right)$$

<u>Sympy 1.8 under Python 3.8.8 output</u>

Timed out

8.58 Problem number 1856

$$\int \frac{\sqrt{1-2x}}{(2+3x)^4(3+5x)^3}\,dx$$

Optimal antiderivative

$$\frac{2528082\operatorname{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{343}-\frac{551075\operatorname{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{121}$$
$$-\frac{182335\sqrt{1-2x}}{294\,(3+5x)^2}+\frac{\sqrt{1-2x}}{3\,(2+3x)^3\,(3+5x)^2}+\frac{29\sqrt{1-2x}}{7\,(2+3x)^2\,(3+5x)^2}$$
$$+\frac{4042\sqrt{1-2x}}{49\,(2+3x)\,(3+5x)^2}+\frac{4031135\sqrt{1-2x}}{1078\,(3+5x)}$$

command

```
integrate((1-2*x)**(1/2)/(2+3*x)**4/(3+5*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.59 Problem number 1903

$$\int \frac{(1-2x)^{3/2}}{(2+3x)^2(3+5x)}\,dx$$

Optimal antiderivative

$$-\frac{22\operatorname{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{5}+\frac{64\operatorname{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{9}+\frac{7\sqrt{1-2x}}{3\,(2+3x)}$$

command

```
integrate((1-2*x)**(3/2)/(2+3*x)**2/(3+5*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{196\left(\left\{\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147}\right.\right.\text{ for}}{3}$$

$$-\frac{434\left(\begin{cases}-\frac{\sqrt{21}\,\operatorname{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\,\operatorname{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)}{3}$$

$$+242\left(\begin{cases}-\frac{\sqrt{55}\,\operatorname{acoth}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x<-\frac{3}{5}\\ -\frac{\sqrt{55}\,\operatorname{atanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x>-\frac{3}{5}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.60 Problem number 1914

$$\int \frac{(1-2x)^{3/2}}{(2+3x)(3+5x)^2}\,dx$$

Optimal antiderivative

$$\frac{72\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{25}-\frac{14\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{3}-\frac{11\sqrt{1-2x}}{5\,(3+5x)}$$

command

```
integrate((1-2*x)**(3/2)/(2+3*x)/(3+5*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{484\left(\begin{cases}\frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}+1\right)}-\frac{1}{4\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}-1\right)}\right)}{605} & \text{fo}\end{cases}\right.}{5}$$

$$+98\left(\begin{cases}-\frac{\sqrt{21}\,\operatorname{acoth}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\,\operatorname{atanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)$$

$$-\frac{814\left(\begin{cases}-\frac{\sqrt{55}\,\operatorname{acoth}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for } x<-\frac{3}{5}\\ -\frac{\sqrt{55}\,\operatorname{atanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)}{55} & \text{for } x>-\frac{3}{5}\end{cases}\right)}{5}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.61 Problem number 2008

$$\int \frac{3+5x}{\sqrt{1-2x}\,(2+3x)^2}\,dx$$

Optimal antiderivative

$$-\frac{68\,\text{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{441}+\frac{\sqrt{1-2x}}{42+63x}$$

command

```
integrate((3+5*x)/(2+3*x)**2/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{4\left(\begin{cases}\frac{\sqrt{21}\left(-\frac{\log\left(-1+\frac{\sqrt{21}}{3\sqrt{1-2x}}\right)}{4}+\frac{\log\left(1+\frac{\sqrt{21}}{3\sqrt{1-2x}}\right)}{4}-\frac{1}{4\cdot\left(1+\frac{\sqrt{21}}{3\sqrt{1-2x}}\right)}-\frac{1}{4\left(-1+\frac{\sqrt{21}}{3\sqrt{1-2x}}\right)}\right)}{63} & \text{for } \frac{1}{\sqrt{1-2x}} > -\end{cases}\right.}{7}$$

$$+\frac{22\left(\begin{cases}-\frac{\sqrt{21}\operatorname{acoth}\left(\frac{\sqrt{21}}{3\sqrt{1-2x}}\right)}{21} & \text{for } \frac{1}{1-2x} > \frac{3}{7}\\ -\frac{\sqrt{21}\operatorname{atanh}\left(\frac{\sqrt{21}}{3\sqrt{1-2x}}\right)}{21} & \text{for } \frac{1}{1-2x} < \frac{3}{7}\end{cases}\right)}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.62 Problem number 2045

$$\int \frac{1}{\sqrt{1-2x}\,(2+3x)^4(3+5x)}\,dx$$

Optimal antiderivative

$$\frac{88310\,\operatorname{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{2401}-\frac{250\,\operatorname{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{11}+\frac{\sqrt{1-2x}}{7\,(2+3x)^3}+\frac{55\sqrt{1-2x}}{49\,(2+3x)^2}+\frac{3840\sqrt{1-2x}}{343\,(2+3x)}$$

command

```
integrate(1/(2+3*x)**4/(3+5*x)/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.63 Problem number 2046

$$\int \frac{1}{\sqrt{1-2x}\,(2+3x)^5(3+5x)}\,dx$$

Optimal antiderivative

$$\frac{36045\,\text{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{196}-\frac{1250\,\text{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{11}+\frac{3\sqrt{1-2x}}{28\,(2+3x)^4}+\frac{3\sqrt{1-2x}}{4\,(2+3x)^3}+\frac{45\sqrt{1-2x}}{8\,(2+3x)^2}+\frac{3135\sqrt{1-2x}}{56\,(2+3x)}$$

command

```
integrate(1/(2+3*x)**5/(3+5*x)/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.64 Problem number 2052

$$\int \frac{2+3x}{\sqrt{1-2x}\,(3+5x)^2}\,dx$$

Optimal antiderivative

$$-\frac{68\,\text{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{3025}-\frac{\sqrt{1-2x}}{55\,(3+5x)}$$

command

```
integrate((2+3*x)/(3+5*x)**2/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{4\left(\left\{\frac{\sqrt{55}\left(-\frac{\log\left(-1+\frac{\sqrt{55}}{5\sqrt{1-2x}}\right)}{4}+\frac{\log\left(1+\frac{\sqrt{55}}{5\sqrt{1-2x}}\right)}{4}-\frac{1}{4\cdot\left(1+\frac{\sqrt{55}}{5\sqrt{1-2x}}\right)}-\frac{1}{4\left(-1+\frac{\sqrt{55}}{5\sqrt{1-2x}}\right)}\right)}{275} \quad \text{for } \frac{1}{\sqrt{1-2x}} > -\right.\right.}{11}$$

$$+\frac{14\left(\begin{cases}-\frac{\sqrt{55}\,\operatorname{acoth}\left(\frac{\sqrt{55}}{5\sqrt{1-2x}}\right)}{55} & \text{for } \frac{1}{1-2x} > \frac{5}{11}\\ -\frac{\sqrt{55}\,\operatorname{atanh}\left(\frac{\sqrt{55}}{5\sqrt{1-2x}}\right)}{55} & \text{for } \frac{1}{1-2x} < \frac{5}{11}\end{cases}\right)}{11}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.65 Problem number 2057

$$\int \frac{1}{\sqrt{1-2x}\,(2+3x)^4(3+5x)^2}\,dx$$

Optimal antiderivative

$$-\frac{1051695\,\operatorname{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{2401}+\frac{32750\,\operatorname{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{121}$$
$$-\frac{1676975\sqrt{1-2x}}{7546\,(3+5x)}+\frac{\sqrt{1-2x}}{7\,(2+3x)^3\,(3+5x)}+\frac{145\sqrt{1-2x}}{98\,(2+3x)^2\,(3+5x)}+\frac{7585\sqrt{1-2x}}{343\,(2+3x)\,(3+5x)}$$

command

```
integrate(1/(2+3*x)**4/(3+5*x)**2/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.66 Problem number 2068

$$\int \frac{1}{\sqrt{1-2x}\,(2+3x)^4(3+5x)^3}\,dx$$

Optimal antiderivative

$$\frac{7852680\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{2401} - \frac{2689875\,\mathrm{arctanh}\left(\frac{\sqrt{55}\,\sqrt{1-2x}}{11}\right)\sqrt{55}}{1331} - \frac{2076675\sqrt{1-2x}}{7546\,(3+5x)^2} + \frac{\sqrt{1-2x}}{7\,(2+3x)^3\,(3+5x)^2} + \frac{90\sqrt{1-2x}}{49\,(2+3x)^2\,(3+5x)^2} + \frac{12555\sqrt{1-2x}}{343\,(2+3x)\,(3+5x)^2} + \frac{137735775\sqrt{1-2x}}{83006\,(3+5x)}$$

command

```
integrate(1/(2+3*x)**4/(3+5*x)**3/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.67 Problem number 2142

$$\int \frac{3+5x}{(1-2x)^{5/2}(2+3x)^2}\,dx$$

Optimal antiderivative

$$\frac{20}{147\,(1-2x)^{\frac{3}{2}}} + \frac{1}{21\,(1-2x)^{\frac{3}{2}}\,(2+3x)} - \frac{60\,\mathrm{arctanh}\left(\frac{\sqrt{21}\,\sqrt{1-2x}}{7}\right)\sqrt{21}}{2401} + \frac{60}{343\sqrt{1-2x}}$$

command

```
integrate((3+5*x)/(1-2*x)**(5/2)/(2+3*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{12\left(\begin{cases}\frac{\sqrt{21}\left(-\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}+1\right)}-\frac{1}{4\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}-1\right)}\right)}{147} & \text{for } \cdots\end{cases}\right)}{49}$$

$$+\frac{186\left(\begin{cases}-\frac{\sqrt{21}\operatorname{acoth}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x<-\frac{2}{3}\\ -\frac{\sqrt{21}\operatorname{atanh}\left(\frac{\sqrt{21}\sqrt{1-2x}}{7}\right)}{21} & \text{for } x>-\frac{2}{3}\end{cases}\right)}{343}+\frac{62}{343\sqrt{1-2x}}+\frac{22}{147\,(1-2x)^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.68 Problem number 2185

$$\int \frac{2+3x}{(1-2x)^{5/2}(3+5x)^2}\,dx$$

Optimal antiderivative

$$\frac{76}{1815\,(1-2x)^{\frac{3}{2}}}-\frac{1}{55\,(1-2x)^{\frac{3}{2}}\,(3+5x)}-\frac{76\operatorname{arctanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)\sqrt{55}}{14641}+\frac{76}{1331\sqrt{1-2x}}$$

command

```
integrate((2+3*x)/(1-2*x)**(5/2)/(3+5*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{20\left(\begin{cases}\frac{\sqrt{55}\left(-\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}+1\right)}-\frac{1}{4\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}-1\right)}\right)}{605} & \text{fo}\cdots\end{cases}\right)}{121}$$

$$+\frac{370\left(\begin{cases}-\frac{\sqrt{55}\operatorname{acoth}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x<-\frac{3}{5}\\ -\frac{\sqrt{55}\operatorname{atanh}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{55} & \text{for } x>-\frac{3}{5}\end{cases}\right)}{1331}+\frac{74}{1331\sqrt{1-2x}}+\frac{14}{363\,(1-2x)^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.69 Problem number 2203

$$\int \frac{\sqrt{a+bx}\,(A+Bx)}{\sqrt{d+ex}}\,dx$$

Optimal antiderivative

$$\frac{(-ae+bd)\,(-4Abe+Bae+3Bbd)\,\operatorname{arctanh}\left(\frac{\sqrt{e}\,\sqrt{bx+a}}{\sqrt{b}\,\sqrt{ex+d}}\right)}{4b^{\frac{3}{2}}e^{\frac{5}{2}}} + \frac{B(bx+a)^{\frac{3}{2}}\,\sqrt{ex+d}}{2be} - \frac{(-4Abe+Bae+3Bbd)\,\sqrt{bx+a}\,\sqrt{ex+d}}{4b\,e^{2}}$$

command

```
integrate((B*x+A)*(b*x+a)**(1/2)/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.70 Problem number 2264

$$\int \sqrt{1-2x}\,(2+3x)^2\sqrt{3+5x}\,dx$$

Optimal antiderivative

$$-\frac{37(1-2x)^{\frac{3}{2}}\,(3+5x)^{\frac{3}{2}}}{160} - \frac{3(1-2x)^{\frac{3}{2}}\,(2+3x)\,(3+5x)^{\frac{3}{2}}}{40} + \frac{158873\arcsin\left(\frac{\sqrt{22}\,\sqrt{3+5x}}{11}\right)\sqrt{10}}{128000} - \frac{1313(1-2x)^{\frac{3}{2}}\,\sqrt{3+5x}}{1280} + \frac{14443\sqrt{1-2x}\,\sqrt{3+5x}}{12800}$$

command

```
integrate((2+3*x)**2*(1-2*x)**(1/2)*(3+5*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{49\sqrt{2}\left(\left(\begin{cases}\frac{121\sqrt{5}\left(-\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{121}+\operatorname{asin}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)\right)}{200} & \text{for } \sqrt{1-2x}>-\frac{\sqrt{55}}{5}\wedge\sqrt{1-2x}\end{cases}\right.\right.}{8}$$

$$+\frac{21\sqrt{2}\left(\left(\begin{cases}\frac{1331\sqrt{5}\left(-\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{7986}-\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{1936}+\frac{\operatorname{asin}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{16}\right)}{125} & \text{for } \sqrt{1-2x}\end{cases}\right.\right.}{4}$$

$$-\frac{9\sqrt{2}\left(\left(\begin{cases}\frac{14641\sqrt{5}\left(-\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{7986}-\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{3872}-\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(12100x-2000(1-2x}{1874048}\right.}{625}\end{cases}\right.\right.}{8}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.71 Problem number 2274

$$\int \sqrt{1-2x}\,(2+3x)^4(3+5x)^{3/2}\,dx$$

Optimal antiderivative

$$-\frac{52760369(1-2x)^{\frac{3}{2}}(3+5x)^{\frac{3}{2}}}{7680000}-\frac{403(1-2x)^{\frac{3}{2}}(2+3x)^2(3+5x)^{\frac{5}{2}}}{2800}$$
$$-\frac{3(1-2x)^{\frac{3}{2}}(2+3x)^3(3+5x)^{\frac{5}{2}}}{70}-\frac{(1-2x)^{\frac{3}{2}}(3+5x)^{\frac{5}{2}}(1480103+874608x)}{640000}$$
$$+\frac{70224051139\arcsin\left(\frac{\sqrt{22}\sqrt{3+5x}}{11}\right)\sqrt{10}}{2048000000}$$
$$-\frac{580364059(1-2x)^{\frac{3}{2}}\sqrt{3+5x}}{20480000}+\frac{6384004649\sqrt{1-2x}\sqrt{3+5x}}{204800000}$$

command

```
integrate((2+3*x)**4*(3+5*x)**(3/2)*(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.72 Problem number 2286

$$\int \sqrt{1-2x}\,(2+3x)^4(3+5x)^{5/2}\,dx$$

Optimal antiderivative

$$-\frac{1493993699(1-2x)^{\frac{3}{2}}\,(3+5x)^{\frac{3}{2}}}{49152000}-\frac{135817609(1-2x)^{\frac{3}{2}}\,(3+5x)^{\frac{5}{2}}}{20480000}-\frac{1419(1-2x)^{\frac{3}{2}}\,(2+3x)^2\,(3+5x)^{\frac{7}{2}}}{11200}-\frac{3(1-2x)^{\frac{3}{2}}\,(2+3x)^3\,(3+5x)^{\frac{7}{2}}}{80}-\frac{3(1-2x)^{\frac{3}{2}}\,(3+5x)^{\frac{7}{2}}\,(899099+522420x)}{1280000}+\frac{1988505613369\arcsin\left(\frac{\sqrt{22}\,\sqrt{3+5x}}{11}\right)\sqrt{10}}{13107200000}-\frac{16433930689(1-2x)^{\frac{3}{2}}\,\sqrt{3+5x}}{131072000}+\frac{180773237579\sqrt{1-2x}\,\sqrt{3+5x}}{1310720000}$$

command

```
integrate((2+3*x)**4*(3+5*x)**(5/2)*(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.73 Problem number 2287

$$\int \sqrt{1-2x}\,(2+3x)^3(3+5x)^{5/2}\,dx$$

Optimal antiderivative

$$-\frac{3262963(1-2x)^{\frac{3}{2}}\,(3+5x)^{\frac{3}{2}}}{307200}-\frac{296633(1-2x)^{\frac{3}{2}}\,(3+5x)^{\frac{5}{2}}}{128000}-\frac{3(1-2x)^{\frac{3}{2}}\,(2+3x)^2\,(3+5x)^{\frac{7}{2}}}{70}-\frac{3(1-2x)^{\frac{3}{2}}\,(3+5x)^{\frac{7}{2}}\,(1963+1140x)}{8000}+\frac{4343003753\arcsin\left(\frac{\sqrt{22}\,\sqrt{3+5x}}{11}\right)\sqrt{10}}{81920000}-\frac{35892593(1-2x)^{\frac{3}{2}}\,\sqrt{3+5x}}{819200}+\frac{394818523\sqrt{1-2x}\,\sqrt{3+5x}}{8192000}$$

command

```
integrate((2+3*x)**3*(3+5*x)**(5/2)*(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.74 Problem number 2361

$$\int \frac{(1-2x)^{3/2}(2+3x)^3}{\sqrt{3+5x}}\,dx$$

Optimal antiderivative

$$\frac{18648399 \arcsin\left(\frac{\sqrt{22}\,\sqrt{3+5x}}{11}\right)\sqrt{10}}{32000000} + \frac{51373(1-2x)^{\frac{3}{2}}\sqrt{3+5x}}{320000} - \frac{3(1-2x)^{\frac{5}{2}}(2+3x)^2\sqrt{3+5x}}{50} - \frac{3(1-2x)^{\frac{5}{2}}(14629+11580x)\sqrt{3+5x}}{80000} + \frac{1695309\sqrt{1-2x}\,\sqrt{3+5x}}{3200000}$$

command

```
integrate((1-2*x)**(3/2)*(2+3*x)**3/(3+5*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{343\sqrt{2}\left(\left(\begin{cases}\frac{121\sqrt{5}\left(\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{968}-\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}}{22}+\frac{3\operatorname{asin}\left(\frac{\sqrt{55}\sqrt{1-2x}}{11}\right)}{8}\right)}{125} & \text{for } \sqrt{1-\cdots}\end{cases}\right.\right.}{8}$$

$$+\frac{441\sqrt{2}\left(\left(\begin{cases}\frac{1331\sqrt{5}\cdot\left(\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{7986}+\frac{3\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{1936}-\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}}{22}+\frac{5\operatorname{asin}\left(\frac{\sqrt{55}\cdots}{\cdots}\right)}{16\cdots}\right.}{625}\end{cases}\right.\right.}{8}$$

$$-\frac{189\sqrt{2}\left(\left(\begin{cases}\frac{14641\sqrt{5}\cdot\left(\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{3993}+\frac{7\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{3872}+\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(12100x-2000(1-\cdots}{1874048}\right.}{3125}\end{cases}\right.\right.}{\cdots}$$

$$+\frac{27\sqrt{2}\left(\left(\begin{cases}\frac{161051\sqrt{5}\left(-\frac{5\sqrt{5}(1-2x)^{\frac{5}{2}}(10x+6)^{\frac{5}{2}}}{322102}+\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{2662}+\frac{15\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{7744}+\frac{5\sqrt{5}\sqrt{1-2x}\cdots}{\cdots}\right.}{15625}\end{cases}\right.\right.}{\cdots}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.75 Problem number 2388

$$\int (1-2x)^{5/2}(2+3x)^3\sqrt{3+5x}\,dx$$

Optimal antiderivative

$$-\frac{3(1-2x)^{\frac{7}{2}}(2+3x)^2(3+5x)^{\frac{3}{2}}}{70}-\frac{3(1-2x)^{\frac{7}{2}}(3+5x)^{\frac{3}{2}}(33857+26700x)}{280000}+\frac{3735929329\arcsin\left(\frac{\sqrt{22}\sqrt{3+5x}}{11}\right)\sqrt{10}}{2560000000}+\frac{30875449(1-2x)^{\frac{3}{2}}\sqrt{3+5x}}{76800000}+\frac{2806859(1-2x)^{\frac{5}{2}}\sqrt{3+5x}}{19200000}-\frac{255169(1-2x)^{\frac{7}{2}}\sqrt{3+5x}}{640000}+\frac{339629939\sqrt{1-2x}\sqrt{3+5x}}{256000000}$$

command

```
integrate((1-2*x)**(5/2)*(2+3*x)**3*(3+5*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

8.76 Problem number 2426

$$\int \frac{(1-2x)^{5/2}(2+3x)^2}{\sqrt{3+5x}}\,dx$$

Optimal antiderivative

$$\frac{6531217\arcsin\left(\frac{\sqrt{22}\,\sqrt{3+5x}}{11}\right)\sqrt{10}}{16000000}+\frac{53977(1-2x)^{\frac{3}{2}}\sqrt{3+5x}}{480000}+\frac{4907(1-2x)^{\frac{5}{2}}\sqrt{3+5x}}{120000}-\frac{369(1-2x)^{\frac{7}{2}}\sqrt{3+5x}}{4000}-\frac{3(1-2x)^{\frac{7}{2}}(2+3x)\sqrt{3+5x}}{50}+\frac{593747\sqrt{1-2x}\,\sqrt{3+5x}}{1600000}$$

command

```
integrate((1-2*x)**(5/2)*(2+3*x)**2/(3+5*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{49\sqrt{2}\left(\left(\begin{cases}\frac{1331\sqrt{5}\cdot\left(\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{7986}+\frac{3\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{1936}-\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}}{22}+\frac{5\operatorname{asin}\left(\frac{\sqrt{55}\sqrt{\cdots}}{\cdots}\right)}{16}\cdots\right.}{625}\cdots\right.\right.}{4}$$

$$+\frac{21\sqrt{2}\left(\left(\begin{cases}\frac{14641\sqrt{5}\cdot\left(\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{3993}+\frac{7\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{3872}+\frac{\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot\left(12100x-2000(1-2\cdots\right.}{1874048}\cdots\right.}{3125}\cdots\right.\right.}{\cdots}$$

$$-\frac{9\sqrt{2}\left(\left(\begin{cases}\frac{161051\sqrt{5}\left(-\frac{5\sqrt{5}(1-2x)^{\frac{5}{2}}(10x+6)^{\frac{5}{2}}}{322102}+\frac{5\sqrt{5}(1-2x)^{\frac{3}{2}}(10x+6)^{\frac{3}{2}}}{2662}+\frac{15\sqrt{5}\sqrt{1-2x}\sqrt{10x+6}\cdot(20x+1)}{7744}+\frac{5\sqrt{5}\sqrt{1-2x}\sqrt{\cdots}}{\cdots}\cdots\right.}{15625}\cdots\right.\right.}{\cdots}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.77 Problem number 2468

$$\int \frac{(2+3x)^3(3+5x)^{3/2}}{\sqrt{1-2x}}\,dx$$

Optimal antiderivative

$$\frac{333216939 \arcsin\left(\frac{\sqrt{22}\,\sqrt{3+5x}}{11}\right)\sqrt{10}}{5120000} - \frac{917953(3+5x)^{\frac{3}{2}}\sqrt{1-2x}}{128000} - \frac{3(2+3x)^2(3+5x)^{\frac{5}{2}}\sqrt{1-2x}}{50} - \frac{3(3+5x)^{\frac{5}{2}}(7889+3900x)\sqrt{1-2x}}{16000} - \frac{30292449\sqrt{1-2x}\,\sqrt{3+5x}}{512000}$$

command

```
integrate((2+3*x)**3*(3+5*x)**(3/2)/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2\sqrt{5}\left(\left\{\frac{121\sqrt{2}\left(\frac{\sqrt{2}\,\sqrt{5-10x}\,(-20x-1)\sqrt{5x+3}}{968}-\frac{\sqrt{2}\,\sqrt{5-10x}\,\sqrt{5x+3}}{22}+\frac{3\,\mathrm{asin}\left(\frac{\sqrt{22}\,\sqrt{5x+3}}{11}\right)}{8}\right)}{8}\right.\right.\quad \text{for } \sqrt{5x+3}}{625}$$

$$+\frac{18\sqrt{5}\left(\left\{\frac{1331\sqrt{2}\left(\frac{\sqrt{2}\,(5-10x)^{\frac{3}{2}}(5x+3)^{\frac{3}{2}}}{3993}+\frac{3\sqrt{2}\,\sqrt{5-10x}\,(-20x-1)\sqrt{5x+3}}{1936}-\frac{\sqrt{2}\,\sqrt{5-10x}\,\sqrt{5x+3}}{22}+\frac{5\,\mathrm{asin}\left(\frac{\sqrt{22}\,\sqrt{5}}{11}\right.}{16}\right.}{16}\right.\right.}{625}$$

$$+\frac{54\sqrt{5}\left(\left\{\frac{14641\sqrt{2}\cdot\left(\frac{2\sqrt{2}\,(5-10x)^{\frac{3}{2}}(5x+3)^{\frac{3}{2}}}{3993}+\frac{7\sqrt{2}\,\sqrt{5-10x}\,(-20x-1)\sqrt{5x+3}}{3872}+\frac{\sqrt{2}\,\sqrt{5-10x}\,\sqrt{5x+3}\,(-12100x-128(5x-}{1874048}\right.}{32}\right.\right.}{}$$

$$+\frac{54\sqrt{5}\left(\left\{\frac{161051\sqrt{2}\left(-\frac{2\sqrt{2}\,(5-10x)^{\frac{5}{2}}(5x+3)^{\frac{5}{2}}}{805255}+\frac{\sqrt{2}\,(5-10x)^{\frac{3}{2}}(5x+3)^{\frac{3}{2}}}{1331}+\frac{15\sqrt{2}\,\sqrt{5-10x}\,(-20x-1)\sqrt{5x+3}}{7744}+\frac{5\sqrt{2}\,\sqrt{5-10x}}{}\right.}{64}\right.\right.}{}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.78 Problem number 2479

$$\int \frac{(2+3x)^2(3+5x)^{5/2}}{\sqrt{1-2x}}\,dx$$

Optimal antiderivative

$$\frac{104040277 \arcsin\left(\frac{\sqrt{22}\,\sqrt{3+5x}}{11}\right)\sqrt{10}}{1024000} - \frac{859837(3+5x)^{\frac{3}{2}}\sqrt{1-2x}}{76800} - \frac{78167(3+5x)^{\frac{5}{2}}\sqrt{1-2x}}{48000} - \frac{963(3+5x)^{\frac{7}{2}}\sqrt{1-2x}}{4000} - \frac{3(2+3x)(3+5x)^{\frac{7}{2}}\sqrt{1-2x}}{50} - \frac{9458207\sqrt{1-2x}\,\sqrt{3+5x}}{102400}$$

command

```
integrate((2+3*x)**2*(3+5*x)**(5/2)/(1-2*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2\sqrt{5}\left(\left\{\frac{1331\sqrt{2}\left(\frac{\sqrt{2}\,(5-10x)^{\frac{3}{2}}(5x+3)^{\frac{3}{2}}}{3993} + \frac{3\sqrt{2}\,\sqrt{5-10x}\,(-20x-1)\sqrt{5x+3}}{1936} - \frac{\sqrt{2}\,\sqrt{5-10x}\,\sqrt{5x+3}}{22} + \frac{5\operatorname{asin}\left(\frac{\sqrt{22}\,\sqrt{5x+\cdots}}{11}\right.\cdots}{16}\cdots\right.}{16}\cdots\right.\right.}{125\cdots}$$

$$+\frac{12\sqrt{5}\left(\left\{\frac{14641\sqrt{2}\cdot\left(\frac{2\sqrt{2}\,(5-10x)^{\frac{3}{2}}(5x+3)^{\frac{3}{2}}}{3993} + \frac{7\sqrt{2}\,\sqrt{5-10x}\,(-20x-1)\sqrt{5x+3}}{3872} + \frac{\sqrt{2}\,\sqrt{5-10x}\,\sqrt{5x+3}\,(-12100x-128(5x\cdots}{1874048\cdots}\cdots\right.}{32\cdots}\cdots\right.\right.}{\cdots}$$

$$+\frac{18\sqrt{5}\left(\left\{\frac{161051\sqrt{2}\left(-\frac{2\sqrt{2}\,(5-10x)^{\frac{5}{2}}(5x+3)^{\frac{5}{2}}}{805255} + \frac{\sqrt{2}\,(5-10x)^{\frac{3}{2}}(5x+3)^{\frac{3}{2}}}{1331} + \frac{15\sqrt{2}\,\sqrt{5-10x}\,(-20x-1)\sqrt{5x+3}}{7744} + \frac{5\sqrt{2}\,\sqrt{5-10x}\cdots}{\cdots}\cdots\right.}{64\cdots}\cdots\right.\right.}{\cdots}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

8.79 Problem number 3180

$$\int (a+bx)^4(A+Bx)(d+ex)^m\,dx$$

Optimal antiderivative

$$-\frac{(-ae+bd)^4\,(-Ae+Bd)\,(ex+d)^{1+m}}{e^6\,(1+m)}+\frac{(-ae+bd)^3\,(-4Abe-Bae+5Bbd)\,(ex+d)^{2+m}}{e^6\,(2+m)}$$
$$-\frac{2b(-ae+bd)^2\,(-3Abe-2Bae+5Bbd)\,(ex+d)^{3+m}}{e^6\,(3+m)}$$
$$+\frac{2b^2(-ae+bd)\,(-2Abe-3Bae+5Bbd)\,(ex+d)^{4+m}}{e^6\,(4+m)}$$
$$-\frac{b^3(-Abe-4Bae+5Bbd)\,(ex+d)^{5+m}}{e^6\,(5+m)}+\frac{b^4B(ex+d)^{6+m}}{e^6\,(6+m)}$$

command

```
integrate((b*x+a)**4*(B*x+A)*(e*x+d)**m,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

9 Test file number 16

Test folder name:

`test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.1_Linear/16_1.1.1.5_P-x-a+b_x-^m-c+d_x-^n`

9.1 Problem number 1

$$\int \frac{(a+bx)^3\,\left(A+Bx+Cx^2+Dx^3\right)}{\sqrt{c+dx}}\,dx$$

Optimal antiderivative

$$-\frac{2(-ad+bc)^2\left(ad\left(-B\,d^2+2cCd-3c^2D\right)-b\left(3A\,d^3-4Bc\,d^2+5c^2Cd-6c^3D\right)\right)(dx+c)^{\frac{3}{2}}}{3d^7}$$
$$-\frac{2(-ad+bc)\left(a^2d^2(Cd-3cD)-abd\left(-3B\,d^2+8cCd-15c^2D\right)+b^2\left(3A\,d^3-6Bc\,d^2+10c^2Cd-15c^3D\right)\right)(dx+}{5d^7}$$
$$+\frac{2\left(a^3d^3D+3a^2b\,d^2(Cd-4cD)-3a\,b^2d\left(-B\,d^2+4cCd-10c^2D\right)+b^3\left(A\,d^3-4Bc\,d^2+10c^2Cd-20c^3D\right)\right)(dx+}{7d^7}$$
$$+\frac{2b\left(3a^2d^2D+3abd(Cd-5cD)-b^2\left(-B\,d^2+5cCd-15c^2D\right)\right)(dx+c)^{\frac{9}{2}}}{9d^7}$$
$$+\frac{2b^2(bCd+3adD-6bcD)(dx+c)^{\frac{11}{2}}}{11d^7}+\frac{2b^3D(dx+c)^{\frac{13}{2}}}{13d^7}$$
$$-\frac{2(-ad+bc)^3\left(A\,d^3-Bc\,d^2+c^2Cd-c^3D\right)\sqrt{dx+c}}{d^7}$$

command

```
integrate((b*x+a)**3*(D*x**3+C*x**2+B*x+A)/(d*x+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

9.2 Problem number 10

$$\int\frac{(a+bx)^3\left(A+Bx+Cx^2+Dx^3\right)}{(c+dx)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2(-ad+bc)\left(a^2d^2(Cd-3cD)-abd\left(-3B\,d^2+8cCd-15c^2D\right)+b^2\left(3A\,d^3-6Bc\,d^2+10c^2Cd-15c^3D\right)\right)(dx+}{3d^7}$$
$$+\frac{2\left(a^3d^3D+3a^2b\,d^2(Cd-4cD)-3a\,b^2d\left(-B\,d^2+4cCd-10c^2D\right)+b^3\left(A\,d^3-4Bc\,d^2+10c^2Cd-20c^3D\right)\right)(dx+}{5d^7}$$
$$+\frac{2b\left(3a^2d^2D+3abd(Cd-5cD)-b^2\left(-B\,d^2+5cCd-15c^2D\right)\right)(dx+c)^{\frac{7}{2}}}{7d^7}$$
$$+\frac{2b^2(bCd+3adD-6bcD)(dx+c)^{\frac{9}{2}}}{9d^7}+\frac{2b^3D(dx+c)^{\frac{11}{2}}}{11d^7}$$
$$+\frac{2(-ad+bc)^3\left(A\,d^3-Bc\,d^2+c^2Cd-c^3D\right)}{d^7\sqrt{dx+c}}$$
$$-\frac{2(-ad+bc)^2\left(ad\left(-B\,d^2+2cCd-3c^2D\right)-b\left(3A\,d^3-4Bc\,d^2+5c^2Cd-6c^3D\right)\right)\sqrt{dx+c}}{d^7}$$

command

```
integrate((b*x+a)**3*(D*x**3+C*x**2+B*x+A)/(d*x+c)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2Db^3(c+dx)^{\frac{11}{2}}}{11d^7}+\frac{(c+dx)^{\frac{9}{2}}\cdot(2Cb^3d+6Dab^2d-12Db^3c)}{9d^7}$$
$$+\frac{(c+dx)^{\frac{7}{2}}\cdot(2Bb^3d^2+6Cab^2d^2-10Cb^3cd+6Da^2bd^2-30Dab^2cd+30Db^3c^2)}{7d^7}$$
$$+\frac{(c+dx)^{\frac{5}{2}}\cdot(2Ab^3d^3+6Bab^2d^3-8Bb^3cd^2+6Ca^2bd^3-24Cab^2cd^2+20Cb^3c^2d+2Da^3d^3-24Da^2bcd^2+60Dab}{5d^7}$$
$$+\frac{(c+dx)^{\frac{3}{2}}\cdot(6Aab^2d^4-6Ab^3cd^3+6Ba^2bd^4-18Bab^2cd^3+12Bb^3c^2d^2+2Ca^3d^4-18Ca^2bcd^3+36Cab^2c^2d^2-2}{3d^7}$$
$$+\frac{\sqrt{c+dx}\,(6Aa^2bd^5-12Aab^2cd^4+6Ab^3c^2d^3+2Ba^3d^5-12Ba^2bcd^4+18Bab^2c^2d^3-8Bb^3c^3d^2-4Ca^3cd^4+18C}{d^7}$$
$$+\frac{2(ad-bc)^3\left(-Ad^3+Bcd^2-Cc^2d+Dc^3\right)}{d^7\sqrt{c+dx}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

9.3 Problem number 18

$$\int\frac{(a+bx)^3\left(A+Bx+Cx^2+Dx^3\right)}{(c+dx)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{2(-ad+bc)^3\left(A\,d^3-Bc\,d^2+c^2Cd-c^3D\right)}{3d^7\,(dx+c)^{\frac{3}{2}}}$$
$$+\frac{2\left(a^3d^3D+3a^2b\,d^2(Cd-4cD)-3a\,b^2d\left(-B\,d^2+4cCd-10c^2D\right)+b^3\left(A\,d^3-4Bc\,d^2+10c^2Cd-20c^3D\right)\right)(dx+}{3d^7}$$
$$+\frac{2b\left(3a^2d^2D+3abd(Cd-5cD)-b^2\left(-B\,d^2+5cCd-15c^2D\right)\right)(dx+c)^{\frac{5}{2}}}{5d^7}$$
$$+\frac{2b^2(bCd+3adD-6bcD)\,(dx+c)^{\frac{7}{2}}}{7d^7}+\frac{2b^3D(dx+c)^{\frac{9}{2}}}{9d^7}$$
$$+\frac{2(-ad+bc)^2\left(ad\left(-B\,d^2+2cCd-3c^2D\right)-b\left(3A\,d^3-4Bc\,d^2+5c^2Cd-6c^3D\right)\right)}{d^7\sqrt{dx+c}}$$
$$-\frac{2(-ad+bc)\left(a^2d^2(Cd-3cD)-abd\left(-3B\,d^2+8cCd-15c^2D\right)+b^2\left(3A\,d^3-6Bc\,d^2+10c^2Cd-15c^3D\right)\right)\sqrt{dx+}}{d^7}$$

command

```
integrate((b*x+a)**3*(D*x**3+C*x**2+B*x+A)/(d*x+c)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2Db^3(c+dx)^{\frac{9}{2}}}{9d^7}+\frac{(c+dx)^{\frac{7}{2}}\cdot\left(2Cb^3d+6Dab^2d-12Db^3c\right)}{7d^7}$$
$$+\frac{(c+dx)^{\frac{5}{2}}\cdot\left(2Bb^3d^2+6Cab^2d^2-10Cb^3cd+6Da^2bd^2-30Dab^2cd+30Db^3c^2\right)}{5d^7}$$
$$+\frac{(c+dx)^{\frac{3}{2}}\cdot\left(2Ab^3d^3+6Bab^2d^3-8Bb^3cd^2+6Ca^2bd^3-24Cab^2cd^2+20Cb^3c^2d+2Da^3d^3-24Da^2bcd^2+60Dab\right.}{3d^7}$$
$$+\frac{\sqrt{c+dx}\left(6Aab^2d^4-6Ab^3cd^3+6Ba^2bd^4-18Bab^2cd^3+12Bb^3c^2d^2+2Ca^3d^4-18Ca^2bcd^3+36Cab^2c^2d^2-20C\right.}{d^7}$$
$$-\frac{2(ad-bc)^2\cdot\left(3Abd^3+Bad^3-4Bbcd^2-2Cacd^2+5Cbc^2d+3Dac^2d-6Dbc^3\right)}{d^7\sqrt{c+dx}}$$
$$+\frac{2(ad-bc)^3\left(-Ad^3+Bcd^2-Cc^2d+Dc^3\right)}{3d^7\left(c+dx\right)^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

9.4 Problem number 19

$$\int\frac{(a+bx)^2\left(A+Bx+Cx^2+Dx^3\right)}{(c+dx)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2(-ad+bc)^2\left(A\,d^3-Bc\,d^2+c^2Cd-c^3D\right)}{3d^6\left(dx+c\right)^{\frac{3}{2}}}$$
$$+\frac{2\left(a^2d^2D+2abd(Cd-4cD)-b^2\left(-B\,d^2+4cCd-10c^2D\right)\right)\left(dx+c\right)^{\frac{3}{2}}}{3d^6}$$
$$+\frac{2b(bCd+2adD-5bcD)\left(dx+c\right)^{\frac{5}{2}}}{5d^6}+\frac{2b^2D(dx+c)^{\frac{7}{2}}}{7d^6}$$
$$-\frac{2(-ad+bc)\left(ad\left(-B\,d^2+2cCd-3c^2D\right)-b\left(2A\,d^3-3Bc\,d^2+4c^2Cd-5c^3D\right)\right)}{d^6\sqrt{dx+c}}$$
$$+\frac{2\left(a^2d^2(Cd-3cD)-2abd\left(-B\,d^2+3cCd-6c^2D\right)+b^2\left(A\,d^3-3Bc\,d^2+6c^2Cd-10c^3D\right)\right)\sqrt{dx+c}}{d^6}$$

command

```
integrate((b*x+a)**2*(D*x**3+C*x**2+B*x+A)/(d*x+c)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2Db^2(c+dx)^{\frac{7}{2}}}{7d^6}+\frac{(c+dx)^{\frac{5}{2}}\cdot\left(2Cb^2d+4Dabd-10Db^2c\right)}{5d^6}$$
$$+\frac{(c+dx)^{\frac{3}{2}}\cdot\left(2Bb^2d^2+4Cabd^2-8Cb^2cd+2Da^2d^2-16Dabcd+20Db^2c^2\right)}{3d^6}$$
$$+\frac{\sqrt{c+dx}\left(2Ab^2d^3+4Babd^3-6Bb^2cd^2+2Ca^2d^3-12Cabcd^2+12Cb^2c^2d-6Da^2cd^2+24Dabc^2d-20Db^2c^3\right)}{d^6}$$
$$-\frac{2(ad-bc)\left(2Abd^3+Bad^3-3Bbcd^2-2Cacd^2+4Cbc^2d+3Dac^2d-5Dbc^3\right)}{d^6\sqrt{c+dx}}$$
$$+\frac{2(ad-bc)^2\left(-Ad^3+Bcd^2-Cc^2d+Dc^3\right)}{3d^6\,(c+dx)^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

9.5 Problem number 25

$$\int (a+bx)^3(c+dx)^n\left(A+Bx+Cx^2+Dx^3\right)\,dx$$

Optimal antiderivative

$$-\frac{(-ad+bc)^3\left(A\,d^3-Bc\,d^2+c^2Cd-c^3D\right)(dx+c)^{1+n}}{d^7\,(1+n)}$$
$$-\frac{(-ad+bc)^2\left(ad\left(-B\,d^2+2cCd-3c^2D\right)-b\left(3A\,d^3-4Bc\,d^2+5c^2Cd-6c^3D\right)\right)(dx+c)^{2+n}}{d^7\,(2+n)}$$
$$-\frac{(-ad+bc)\left(a^2d^2(Cd-3cD)-abd\left(-3B\,d^2+8cCd-15c^2D\right)+b^2\left(3A\,d^3-6Bc\,d^2+10c^2Cd-15c^3D\right)\right)(dx+c}{d^7\,(3+n)}$$
$$+\frac{\left(a^3d^3D+3a^2b\,d^2(Cd-4cD)-3a\,b^2d\left(-B\,d^2+4cCd-10c^2D\right)+b^3\left(A\,d^3-4Bc\,d^2+10c^2Cd-20c^3D\right)\right)(dx+}{d^7\,(4+n)}$$
$$+\frac{b\left(3a^2d^2D+3abd(Cd-5cD)-b^2\left(-B\,d^2+5cCd-15c^2D\right)\right)(dx+c)^{5+n}}{d^7\,(5+n)}$$
$$+\frac{b^2(bCd+3adD-6bcD)\,(dx+c)^{6+n}}{d^7\,(6+n)}+\frac{b^3D(dx+c)^{7+n}}{d^7\,(7+n)}$$

command

```
integrate((b*x+a)**3*(d*x+c)**n*(D*x**3+C*x**2+B*x+A),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

9.6 Problem number 26

$$\int (a+bx)^2(c+dx)^n \left(A+Bx+Cx^2+Dx^3\right) \, dx$$

Optimal antiderivative

$$\frac{(-ad+bc)^2 \left(A\,d^3-Bc\,d^2+c^2Cd-c^3D\right)(dx+c)^{1+n}}{d^6\,(1+n)} + \frac{(-ad+bc)\left(ad\left(-B\,d^2+2cCd-3c^2D\right)-b\left(2A\,d^3-3Bc\,d^2+4c^2Cd-5c^3D\right)\right)(dx+c)^{2+n}}{d^6\,(2+n)} + \frac{\left(a^2d^2(Cd-3cD)-2abd\left(-B\,d^2+3cCd-6c^2D\right)+b^2\left(A\,d^3-3Bc\,d^2+6c^2Cd-10c^3D\right)\right)(dx+c)^{3+n}}{d^6\,(3+n)} + \frac{\left(a^2d^2D+2abd(Cd-4cD)-b^2\left(-B\,d^2+4cCd-10c^2D\right)\right)(dx+c)^{4+n}}{d^6\,(4+n)} + \frac{b(bCd+2adD-5bcD)\,(dx+c)^{5+n}}{d^6\,(5+n)} + \frac{b^2D(dx+c)^{6+n}}{d^6\,(6+n)}$$

command

```
integrate((b*x+a)**2*(d*x+c)**n*(D*x**3+C*x**2+B*x+A),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

10 Test file number 17

Test folder name:

`test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.1_Linear/17_1.1.1.6_P-x-a+b_x-^m-c+d_x-^n-e+f_x-^p`

10.1 Problem number 4

$$\int \sqrt{1-dx}\,\sqrt{1+dx}\,\left(A+Bx+Cx^2\right) dx$$

Optimal antiderivative

$$-\frac{B\left(-d^2x^2+1\right)^{\frac{3}{2}}}{3d^2} - \frac{Cx\left(-d^2x^2+1\right)^{\frac{3}{2}}}{4d^2} + \frac{\left(4A\,d^2+C\right)\arcsin(dx)}{8d^3} + \frac{\left(4A\,d^2+C\right)x\sqrt{-d^2x^2+1}}{8d^2}$$

command

```
integrate((C*x**2+B*x+A)*(-d*x+1)**(1/2)*(d*x+1)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

11 Test file number 19

Test folder name:

```
test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.2_Quadratic/19_1.1.2.2-c_x-^m-a+b_x^2-^p
```

11.1 Problem number 296

$$\int \frac{x^{7/2}}{(a+bx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{x^{\frac{5}{2}}}{2b\,(b\,x^2+a)}+\frac{5a^{\frac{1}{4}}\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8b^{\frac{9}{4}}}-\frac{5a^{\frac{1}{4}}\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8b^{\frac{9}{4}}}+\frac{5a^{\frac{1}{4}}\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16b^{\frac{9}{4}}}-\frac{5a^{\frac{1}{4}}\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16b^{\frac{9}{4}}}+\frac{5\sqrt{x}}{2b^2}$$

command

```
integrate(x**(7/2)/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\sqrt{x} \\ \frac{2\sqrt{x}}{b^2} \\ \frac{2x^{\frac{9}{2}}}{9a^2} \\ \frac{20a\sqrt{x}}{8ab^2+8b^3x^2}+\frac{5a\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{8ab^2+8b^3x^2}-\frac{5a\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{8ab^2+8b^3x^2}-\frac{10a\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{8ab^2+8b^3x^2}+\frac{16bx^{\frac{5}{2}}}{8ab^2+8b^3x^2}+ \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.2 Problem number 302

$$\int \frac{1}{x^{5/2}\left(a+bx^2\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{7}{6a^2x^{\frac{3}{2}}}+\frac{1}{2a\,x^{\frac{3}{2}}\left(b\,x^2+a\right)}+\frac{7b^{\frac{3}{4}}\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{11}{4}}}$$
$$-\frac{7b^{\frac{3}{4}}\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{11}{4}}}+\frac{7b^{\frac{3}{4}}\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{11}{4}}}$$
$$-\frac{7b^{\frac{3}{4}}\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{11}{4}}}$$

command

```
integrate(1/x**(5/2)/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{x^{\frac{11}{2}}} \\ -\frac{2}{11b^2x^{\frac{11}{2}}} \\ -\frac{2}{3a^2x^{\frac{3}{2}}} \\ -\frac{16a^2}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}}+\frac{21abx^{\frac{3}{2}}\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}}-\frac{21abx^{\frac{3}{2}}\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}}-\frac{42abx^{\frac{3}{2}}\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.3 Problem number 306

$$\int \frac{x^{3/2}}{\left(a+bx^2\right)^3}\,dx$$

Optimal antiderivative

$$-\frac{3\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{7}{4}}b^{\frac{5}{4}}}+\frac{3\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{7}{4}}b^{\frac{5}{4}}}-\frac{3\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{7}{4}}b^{\frac{5}{4}}}+\frac{3\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{7}{4}}b^{\frac{5}{4}}}-\frac{\sqrt{x}}{4b\left(b\,x^{2}+a\right)^{2}}+\frac{\sqrt{x}}{16ab\left(b\,x^{2}+a\right)}$$

command

```
integrate(x**(3/2)/(b*x**2+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{\tilde{\infty}}{x^{\frac{7}{2}}}\\ -\frac{2}{7b^{3}x^{\frac{7}{2}}}\\ \frac{2x^{\frac{5}{2}}}{5a^{3}}\\ -\frac{12a^{2}\sqrt{x}}{64a^{4}b+128a^{3}b^{2}x^{2}+64a^{2}b^{3}x^{4}}-\frac{3a^{2}\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{64a^{4}b+128a^{3}b^{2}x^{2}+64a^{2}b^{3}x^{4}}+\frac{3a^{2}\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{64a^{4}b+128a^{3}b^{2}x^{2}+64a^{2}b^{3}x^{4}}+\frac{6a^{2}\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{64a^{4}b+128a^{3}b^{2}x^{2}+64a^{2}b^{3}x^{4}}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.4 Problem number 307

$$\int\frac{\sqrt{x}}{\left(a+bx^{2}\right)^{3}}\,dx$$

Optimal antiderivative

$$\frac{x^{\frac{3}{2}}}{4a\left(b\,x^{2}+a\right)^{2}}+\frac{5x^{\frac{3}{2}}}{16a^{2}\left(b\,x^{2}+a\right)}-\frac{5\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{9}{4}}b^{\frac{3}{4}}}+\frac{5\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{9}{4}}b^{\frac{3}{4}}}+\frac{5\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{9}{4}}b^{\frac{3}{4}}}-\frac{5\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{9}{4}}b^{\frac{3}{4}}}$$

command

`integrate(x**(1/2)/(b*x**2+a)**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{x^{\frac{9}{2}}} \\ -\frac{2}{9b^3x^{\frac{9}{2}}} \\ \frac{2x^{\frac{3}{2}}}{3a^3} \\ \frac{5a^2\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{64a^4b\sqrt[4]{-\frac{a}{b}}+128a^3b^2x^2\sqrt[4]{-\frac{a}{b}}+64a^2b^3x^4\sqrt[4]{-\frac{a}{b}}} - \frac{5a^2\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{64a^4b\sqrt[4]{-\frac{a}{b}}+128a^3b^2x^2\sqrt[4]{-\frac{a}{b}}+64a^2b^3x^4\sqrt[4]{-\frac{a}{b}}} + \frac{10a^2\operatorname{atan}\left(\cdots\right.}{64a^4b\sqrt[4]{-\frac{a}{b}}+128a^3b^2x^2\cdots} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.5 Problem number 308

$$\int \frac{1}{\sqrt{x}\,(a+bx^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{21\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{11}{4}}b^{\frac{1}{4}}}+\frac{21\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{11}{4}}b^{\frac{1}{4}}}$$
$$-\frac{21\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{11}{4}}b^{\frac{1}{4}}}$$
$$+\frac{21\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{11}{4}}b^{\frac{1}{4}}}+\frac{\sqrt{x}}{4a\,(b\,x^2+a)^2}+\frac{7\sqrt{x}}{16a^2\,(b\,x^2+a)}$$

command

`integrate(1/(b*x**2+a)**3/x**(1/2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{x^{\frac{11}{2}}} \\ -\frac{2}{11b^3x^{\frac{11}{2}}} \\ \frac{2\sqrt{x}}{a^3} \\ \frac{44a^2\sqrt{x}}{64a^5+128a^4bx^2+64a^3b^2x^4} - \frac{21a^2\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{64a^5+128a^4bx^2+64a^3b^2x^4} + \frac{21a^2\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{64a^5+128a^4bx^2+64a^3b^2x^4} + \frac{42a^2\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{64a^5+128a^4bx^2+64a^3b^2x^4} \cdots \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.6 Problem number 924

$$\int \frac{\sqrt[4]{a+bx^2}}{(cx)^{13/2}}\,dx$$

Optimal antiderivative

$$-\frac{2\left(b\,x^{2}+a\right)^{\frac{1}{4}}}{11c\left(cx\right)^{\frac{11}{2}}}-\frac{2b\left(b\,x^{2}+a\right)^{\frac{1}{4}}}{77a\,c^{3}\left(cx\right)^{\frac{7}{2}}}+\frac{4b^{2}\left(b\,x^{2}+a\right)^{\frac{1}{4}}}{77a^{2}c^{5}\left(cx\right)^{\frac{3}{2}}}$$
$$-\frac{4b^{\frac{7}{2}}\left(1+\frac{a}{b\,x^{2}}\right)^{\frac{3}{4}}\left(cx\right)^{\frac{3}{2}}\sqrt{2}\,\sqrt{\frac{\left(x\sqrt{b}+\sqrt{a}\right)\sqrt{\frac{b\,x^{2}+a}{a}}}{\sqrt{a}\,\sqrt{\frac{b\,x^{2}+a}{a}}}}\;\mathrm{EllipticF}\left(\sin\left(\frac{\operatorname{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right),\sqrt{2}\right)}{77\cos\left(\frac{\operatorname{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right)a^{\frac{5}{2}}c^{8}\left(b\,x^{2}+a\right)^{\frac{3}{4}}}$$

command

```
integrate((b*x**2+a)**(1/4)/(c*x)**(13/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\sqrt[4]{b}\,{}_{2}F_{1}\left(\begin{matrix}-\frac{1}{4},\frac{5}{2}\\ \frac{7}{2}\end{matrix}\middle|\,\frac{ae^{i\pi}}{bx^{2}}\right)}{5c^{\frac{13}{2}}x^{5}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.7 Problem number 936

$$\int \frac{\sqrt[4]{a-bx^2}}{(cx)^{13/2}}\,dx$$

Optimal antiderivative

$$-\frac{2\left(-b\,x^2+a\right)^{\frac{1}{4}}}{11c\,(cx)^{\frac{11}{2}}}+\frac{2b\left(-b\,x^2+a\right)^{\frac{1}{4}}}{77a\,c^3\,(cx)^{\frac{7}{2}}}+\frac{4b^2\left(-b\,x^2+a\right)^{\frac{1}{4}}}{77a^2c^5\,(cx)^{\frac{3}{2}}}$$
$$+\frac{8b^{\frac{7}{2}}\left(1-\frac{a}{b\,x^2}\right)^{\frac{3}{4}}(cx)^{\frac{3}{2}}\sqrt{\frac{\sqrt{1-\frac{a}{b\,x^2}}}{2}+\frac{1}{2}}\;\mathrm{EllipticF}\left(\sin\left(\frac{\mathrm{arccsc}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right),\sqrt{2}\right)}{77\cos\left(\frac{\mathrm{arccsc}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right)a^{\frac{5}{2}}c^8\left(-b\,x^2+a\right)^{\frac{3}{4}}}$$

command

```
integrate((-b*x**2+a)**(1/4)/(c*x)**(13/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{i\sqrt[4]{b}\,e^{-\frac{i\pi}{4}}\,{}_2F_1\left(\begin{matrix}-\frac{1}{4},\frac{5}{2}\\ \frac{7}{2}\end{matrix}\middle|\frac{a}{bx^2}\right)}{5c^{\frac{13}{2}}x^5}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.8 Problem number 1052

$$\int x^{3/2}\left(a+bx^2\right)^p\,dx$$

Optimal antiderivative

$$\frac{2x^{\frac{5}{2}}\left(b\,x^2+a\right)^{1+p}\,\mathrm{hypergeom}\left(\left[1,\frac{9}{4}+p\right],\left[\frac{9}{4}\right],-\frac{b\,x^2}{a}\right)}{5a}$$

command

```
integrate(x**(3/2)*(b*x**2+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^p x^{\frac{5}{2}}\Gamma\left(\frac{5}{4}\right){}_2F_1\left(\begin{matrix}\frac{5}{4},-p\\ \frac{9}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{9}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.9 Problem number 1055

$$\int \frac{(a+bx^2)^p}{x^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2\left(b\,x^2+a\right)^{1+p}\text{hypergeom}\left(\left[1,\frac{3}{4}+p\right],\left[\frac{3}{4}\right],-\frac{b\,x^2}{a}\right)}{a\sqrt{x}}$$

command

```
integrate((b*x**2+a)**p/x**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^p\Gamma\left(-\frac{1}{4}\right){}_2F_1\left(\begin{matrix}-\frac{1}{4},-p\\ \frac{3}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2\sqrt{x}\,\Gamma\left(\frac{3}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.10 Problem number 1067

$$\int x^{-1-2p}(a+bx^2)^p\,dx$$

Optimal antiderivative

$$-\frac{\left(b\,x^2+a\right)^{1+p}\text{hypergeom}\left(\left[1,1\right],\left[1-p\right],-\frac{b\,x^2}{a}\right)x^{-2p}}{2ap}$$

command

```
integrate(x**(-1-2*p)*(b*x**2+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^p x^{-2p}\Gamma(-p)\,{}_2F_1\left(\begin{matrix}-p,-p\\ 1-p\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(1-p\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.11 Problem number 1069

$$\int x^{1-2p}(a+bx^2)^p\,dx$$

Optimal antiderivative

$$\frac{x^{2-2p}(b\,x^2+a)^{1+p}\,\text{hypergeom}\left([1,2]\,,[2-p]\,,-\frac{b\,x^2}{a}\right)}{2a\,(1-p)}$$

command

```
integrate(x**(1-2*p)*(b*x**2+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^p x^2 x^{-2p}\Gamma(1-p)\,{}_2F_1\left(\left.\begin{matrix}-p,1-p\\2-p\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(2-p\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.12 Problem number 1070

$$\int x^{2-2p}(a+bx^2)^p\,dx$$

Optimal antiderivative

$$\frac{x^{3-2p}(b\,x^2+a)^{1+p}\,\text{hypergeom}\left(\left[1,\frac{5}{2}\right],\left[\frac{5}{2}-p\right],-\frac{b\,x^2}{a}\right)}{a\,(3-2p)}$$

command

```
integrate(x**(2-2*p)*(b*x**2+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^p x^3 x^{-2p}\Gamma\left(\frac{3}{2}-p\right)\,{}_2F_1\left(\left.\begin{matrix}-p,\frac{3}{2}-p\\\frac{5}{2}-p\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{5}{2}-p\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

11.13 Problem number 1071

$$\int x^{3-2p}(a+bx^2)^p\,dx$$

Optimal antiderivative

$$\frac{x^{4-2p}(b\,x^2+a)^{1+p}\,\text{hypergeom}\left([1,3],[3-p],-\frac{b\,x^2}{a}\right)}{2a\,(2-p)}$$

command

```
integrate(x**(3-2*p)*(b*x**2+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^p x^4 x^{-2p}\Gamma(2-p)\,{}_2F_1\left(\begin{matrix}-p,2-p\\3-p\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma(3-p)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12 Test file number 21

Test folder name:

`test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.2_Quadratic/21_1.1.2.4-e_x-^m-a+b_x^2-^p-c+d_x^2-^q`

12.1 Problem number 375

$$\int\frac{x^{7/2}(A+Bx^2)}{(a+bx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{(5Ab-9Ba)\,x^{\frac{5}{2}}}{10a\,b^2}+\frac{(Ab-Ba)\,x^{\frac{9}{2}}}{2ab\,(b\,x^2+a)}+\frac{a^{\frac{1}{4}}(5Ab-9Ba)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8b^{\frac{13}{4}}}$$
$$-\frac{a^{\frac{1}{4}}(5Ab-9Ba)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8b^{\frac{13}{4}}}$$
$$+\frac{a^{\frac{1}{4}}(5Ab-9Ba)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16b^{\frac{13}{4}}}$$
$$-\frac{a^{\frac{1}{4}}(5Ab-9Ba)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16b^{\frac{13}{4}}}+\frac{(5Ab-9Ba)\sqrt{x}}{2b^3}$$

command

```
integrate(x**(7/2)*(B*x**2+A)/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(2A\sqrt{x}+\frac{2Bx^{\frac{5}{2}}}{5}\right) \\ \frac{\frac{2Ax^{\frac{9}{2}}}{9}+\frac{2Bx^{\frac{13}{2}}}{13}}{a^2} \\ \frac{2A\sqrt{x}+\frac{2Bx^{\frac{5}{2}}}{5}}{b^2} \\ \frac{100Aab\sqrt{x}}{40ab^3+40b^4x^2}+\frac{25Aab\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{40ab^3+40b^4x^2}-\frac{25Aab\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{40ab^3+40b^4x^2}-\frac{50Aab\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{40ab^3+40b^4x^2}+\frac{80}{40ab^3} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.2 Problem number 380

$$\int \frac{A+Bx^2}{x^{3/2}\left(a+bx^2\right)^2}\,dx$$

Optimal antiderivative

$$\frac{(5Ab-Ba)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{9}{4}}b^{\frac{3}{4}}}-\frac{(5Ab-Ba)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{9}{4}}b^{\frac{3}{4}}}$$
$$-\frac{(5Ab-Ba)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{9}{4}}b^{\frac{3}{4}}}$$
$$+\frac{(5Ab-Ba)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{9}{4}}b^{\frac{3}{4}}}+\frac{-5Ab+Ba}{2a^2b\sqrt{x}}+\frac{Ab-Ba}{2ab\left(b\,x^2+a\right)\sqrt{x}}$$

command

```
integrate((B*x**2+A)/x**(3/2)/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{9}{2}}} \\ -\frac{2}{9b^2x^{\frac{9}{2}}} \\ -\frac{2}{a^2\sqrt{x}} \\ -\frac{5a\sqrt{x}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{8a^3\sqrt{x}\sqrt[4]{-\frac{a}{b}}+8a^2bx^{\frac{5}{2}}\sqrt[4]{-\frac{a}{b}}}+\frac{5a\sqrt{x}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{8a^3\sqrt{x}\sqrt[4]{-\frac{a}{b}}+8a^2bx^{\frac{5}{2}}\sqrt[4]{-\frac{a}{b}}}-\frac{10a\sqrt{x}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{8a^3\sqrt{x}\sqrt[4]{-\frac{a}{b}}+8a^2bx^{\frac{5}{2}}\sqrt[4]{-\frac{a}{b}}}-\frac{16a\sqrt[4]{}}{8a^3\sqrt{x}\sqrt[4]{-\frac{a}{b}}}\end{cases}\right.$$

$$+\frac{2Bx^{\frac{3}{2}}}{4a^2+4abx^2}+2B\operatorname{RootSum}\left(65536t^4a^5b^3+1,\left(t\mapsto t\log\left(4096t^3a^4b^2+\sqrt{x}\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.3 Problem number 381

$$\int\frac{A+Bx^2}{x^{5/2}\left(a+bx^2\right)^2}\,dx$$

Optimal antiderivative

$$\frac{-7Ab+3Ba}{6a^2b\,x^{\frac{3}{2}}}+\frac{Ab-Ba}{2ab\,x^{\frac{3}{2}}\left(b\,x^2+a\right)}+\frac{(7Ab-3Ba)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{11}{4}}b^{\frac{1}{4}}}$$
$$-\frac{(7Ab-3Ba)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{11}{4}}b^{\frac{1}{4}}}$$
$$+\frac{(7Ab-3Ba)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{11}{4}}b^{\frac{1}{4}}}$$
$$-\frac{(7Ab-3Ba)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{11}{4}}b^{\frac{1}{4}}}$$

command

```
integrate((B*x**2+A)/x**(5/2)/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{7x^{\frac{7}{2}}}\right) \\ \frac{-\frac{2A}{3x^{\frac{3}{2}}}+2B\sqrt{x}}{a^2} \\ \frac{-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{7x^{\frac{7}{2}}}}{b^2} \\ -\frac{16Aa^2}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}}+\frac{21Aabx^{\frac{3}{2}}\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}}-\frac{21Aabx^{\frac{3}{2}}\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}}-\frac{42Aabx^{\frac{3}{2}}\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{}}{\sqrt[4]{-}}\right.}{24a^4x^{\frac{3}{2}}+24a^3bx^{\frac{7}{2}}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.4 Problem number 385

$$\int \frac{x^{3/2}(A+Bx^2)}{(a+bx^2)^3}\,dx$$

Optimal antiderivative

$$\frac{(Ab-Ba)\,x^{\frac{5}{2}}}{4ab\,(b\,x^2+a)^2}-\frac{(3Ab+5Ba)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{7}{4}}b^{\frac{9}{4}}}$$
$$+\frac{(3Ab+5Ba)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{7}{4}}b^{\frac{9}{4}}}$$
$$-\frac{(3Ab+5Ba)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{7}{4}}b^{\frac{9}{4}}}$$
$$+\frac{(3Ab+5Ba)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{7}{4}}b^{\frac{9}{4}}}-\frac{(3Ab+5Ba)\sqrt{x}}{16a\,b^2\,(b\,x^2+a)}$$

command

```
integrate(x**(3/2)*(B*x**2+A)/(b*x**2+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.5 Problem number 387

$$\int \frac{A+Bx^2}{\sqrt{x}\,(a+bx^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{3(7Ab+Ba)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{11}{4}}b^{\frac{5}{4}}}+\frac{3(7Ab+Ba)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{64a^{\frac{11}{4}}b^{\frac{5}{4}}}$$
$$-\frac{3(7Ab+Ba)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{11}{4}}b^{\frac{5}{4}}}$$
$$+\frac{3(7Ab+Ba)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128a^{\frac{11}{4}}b^{\frac{5}{4}}}+\frac{(Ab-Ba)\sqrt{x}}{4ab\,(b\,x^2+a)^2}+\frac{(7Ab+Ba)\sqrt{x}}{16a^2b\,(b\,x^2+a)}$$

command

```
integrate((B*x**2+A)/(b*x**2+a)**3/x**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.6 Problem number 415

$$\int \frac{x^{7/2}\left(a+bx^2\right)^2}{c+dx^2}\,dx$$

Optimal antiderivative

$$\frac{2(-ad+bc)^2\,x^{\frac{5}{2}}}{5d^3}-\frac{2b(-2ad+bc)\,x^{\frac{9}{2}}}{9d^2}+\frac{2b^2x^{\frac{13}{2}}}{13d}$$
$$-\frac{c^{\frac{5}{4}}(-ad+bc)^2\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{2d^{\frac{17}{4}}}$$
$$+\frac{c^{\frac{5}{4}}(-ad+bc)^2\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{2d^{\frac{17}{4}}}$$
$$-\frac{c^{\frac{5}{4}}(-ad+bc)^2\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4d^{\frac{17}{4}}}$$
$$+\frac{c^{\frac{5}{4}}(-ad+bc)^2\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4d^{\frac{17}{4}}}-\frac{2c(-ad+bc)^2\sqrt{x}}{d^4}$$

command

```
integrate(x**(7/2)*(b*x**2+a)**2/(d*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(\frac{2a^2x^{\frac{5}{2}}}{5} + \frac{4abx^{\frac{9}{2}}}{9} + \frac{2b^2x^{\frac{13}{2}}}{13}\right) \\ \frac{\frac{2a^2x^{\frac{5}{2}}}{5} + \frac{4abx^{\frac{9}{2}}}{9} + \frac{2b^2x^{\frac{13}{2}}}{13}}{d} \\ \frac{\frac{2a^2x^{\frac{9}{2}}}{9} + \frac{4abx^{\frac{13}{2}}}{13} + \frac{2b^2x^{\frac{17}{2}}}{17}}{c} \\ -\frac{2a^2c\sqrt{x}}{d^2} - \frac{a^2c\sqrt[4]{-\frac{c}{d}}\log\left(\sqrt{x} - \sqrt[4]{-\frac{c}{d}}\right)}{2d^2} + \frac{a^2c\sqrt[4]{-\frac{c}{d}}\log\left(\sqrt{x} + \sqrt[4]{-\frac{c}{d}}\right)}{2d^2} + \frac{a^2c\sqrt[4]{-\frac{c}{d}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{c}{d}}}\right)}{d^2} + \frac{2a^2x^{\frac{5}{2}}}{5d} + 4abc^2 \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.7 Problem number 416

$$\int \frac{x^{5/2}(a+bx^2)^2}{c+dx^2}\,dx$$

Optimal antiderivative

$$\begin{aligned} &\frac{2(-ad+bc)^2 x^{\frac{3}{2}}}{3d^3} - \frac{2b(-2ad+bc)x^{\frac{7}{2}}}{7d^2} + \frac{2b^2x^{\frac{11}{2}}}{11d} \\ &+ \frac{c^{\frac{3}{4}}(-ad+bc)^2\arctan\left(1 - \frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{2d^{\frac{15}{4}}} \\ &- \frac{c^{\frac{3}{4}}(-ad+bc)^2\arctan\left(1 + \frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{2d^{\frac{15}{4}}} \\ &- \frac{c^{\frac{3}{4}}(-ad+bc)^2\ln\left(\sqrt{c} + x\sqrt{d} - c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4d^{\frac{15}{4}}} \\ &+ \frac{c^{\frac{3}{4}}(-ad+bc)^2\ln\left(\sqrt{c} + x\sqrt{d} + c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4d^{\frac{15}{4}}} \end{aligned}$$

command

```
integrate(x**(5/2)*(b*x**2+a)**2/(d*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$a^{2}\left(\begin{cases} \tilde{\infty} x^{\frac{3}{2}} & \text{for}\: c = 0 \wedge d = 0 \\ \frac{2 x^{\frac{3}{2}}}{3 d} & \text{for}\: c = 0 \\ \frac{2 x^{\frac{7}{2}}}{7 c} & \text{for}\: d = 0 \\ - \frac{c \log{\left(\sqrt{x} - \sqrt[4]{- \frac{c}{d}} \right)}}{2 d^{2} \sqrt[4]{- \frac{c}{d}}} + \frac{c \log{\left(\sqrt{x} + \sqrt[4]{- \frac{c}{d}} \right)}}{2 d^{2} \sqrt[4]{- \frac{c}{d}}} - \frac{c \operatorname{atan}{\left(\frac{\sqrt{x}}{\sqrt[4]{- \frac{c}{d}}} \right)}}{d^{2} \sqrt[4]{- \frac{c}{d}}} + \frac{2 x^{\frac{3}{2}}}{3 d} & \text{otherwise} \end{cases}\right) + 2 a b \left(\begin{cases} \tilde{\infty} x^{\frac{7}{2}} & \text{for}\: c = 0 \wedge d = 0 \\ \frac{2 x^{\frac{7}{2}}}{7 d} & \text{for}\: c = 0 \\ \frac{2 x^{\frac{11}{2}}}{11 c} & \text{for}\: d = 0 \\ \frac{c^{2} \log{\left(\sqrt{x} - \sqrt[4]{- \frac{c}{d}} \right)}}{2 d^{3} \sqrt[4]{- \frac{c}{d}}} - \frac{c^{2} \log{\left(\sqrt{x} + \sqrt[4]{- \frac{c}{d}} \right)}}{2 d^{3} \sqrt[4]{- \frac{c}{d}}} + \frac{c^{2} \operatorname{atan}{\left(\frac{\sqrt{x}}{\sqrt[4]{- \frac{c}{d}}} \right)}}{d^{3} \sqrt[4]{- \frac{c}{d}}} - \frac{2 c x^{\frac{3}{2}}}{3 d^{2}} + \frac{2 x^{\frac{7}{2}}}{7 d} & \text{otherwise} \end{cases}\right) + b^{2} \left(\begin{cases} \tilde{\infty} x^{\frac{11}{2}} & \text{for}\: c = 0 \wedge d = 0 \\ \frac{2 x^{\frac{11}{2}}}{11 d} & \text{for}\: c = 0 \\ \frac{2 x^{\frac{15}{2}}}{15 c} & \text{for}\: d = 0 \\ - \frac{c^{3} \log{\left(\sqrt{x} - \sqrt[4]{- \frac{c}{d}} \right)}}{2 d^{4} \sqrt[4]{- \frac{c}{d}}} + \frac{c^{3} \log{\left(\sqrt{x} + \sqrt[4]{- \frac{c}{d}} \right)}}{2 d^{4} \sqrt[4]{- \frac{c}{d}}} - \frac{c^{3} \operatorname{atan}{\left(\frac{\sqrt{x}}{\sqrt[4]{- \frac{c}{d}}} \right)}}{d^{4} \sqrt[4]{- \frac{c}{d}}} + \frac{2 c^{2} x^{\frac{3}{2}}}{3 d^{3}} - \frac{2 c x^{\frac{7}{2}}}{7 d^{2}} + \frac{2 x^{\frac{11}{2}}}{11 d} & \text{otherwise} \end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.8 Problem number 423

$$\int \frac{(a+bx^2)^2}{x^{9/2}(c+dx^2)}\,dx$$

Optimal antiderivative

$$-\frac{2a^2}{7c\,x^{\frac{7}{2}}}-\frac{2a(-ad+2bc)}{3c^2x^{\frac{3}{2}}}-\frac{(-ad+bc)^2\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{2c^{\frac{11}{4}}d^{\frac{1}{4}}}$$
$$+\frac{(-ad+bc)^2\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{2c^{\frac{11}{4}}d^{\frac{1}{4}}}$$
$$-\frac{(-ad+bc)^2\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4c^{\frac{11}{4}}d^{\frac{1}{4}}}$$
$$+\frac{(-ad+bc)^2\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4c^{\frac{11}{4}}d^{\frac{1}{4}}}$$

command

```
integrate((b*x**2+a)**2/x**(9/2)/(d*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{2a^2}{11x^{\frac{11}{2}}}-\frac{4ab}{7x^{\frac{7}{2}}}-\frac{2b^2}{3x^{\frac{3}{2}}}\right) \\ \frac{-\frac{2a^2}{11x^{\frac{11}{2}}}-\frac{4ab}{7x^{\frac{7}{2}}}-\frac{2b^2}{3x^{\frac{3}{2}}}}{d} \\ \frac{-\frac{2a^2}{7x^{\frac{7}{2}}}-\frac{4ab}{3x^{\frac{3}{2}}}+2b^2\sqrt{x}}{c} \\ -\frac{2a^2}{7cx^{\frac{7}{2}}}+\frac{2a^2d}{3c^2x^{\frac{3}{2}}}-\frac{a^2d^2\sqrt[4]{-\frac{c}{d}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{c}{d}}\right)}{2c^3}+\frac{a^2d^2\sqrt[4]{-\frac{c}{d}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{c}{d}}\right)}{2c^3}+\frac{a^2d^2\sqrt[4]{-\frac{c}{d}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{c}{d}}}\right)}{c^3}-\frac{4ab}{3cx^{\frac{3}{2}}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.9 Problem number 424

$$\int \frac{(c+dx^2)^2}{x^{11/2}(a+bx^2)}\,dx$$

Optimal antiderivative

$$-\frac{2c^2}{9a\,x^{\frac{9}{2}}}+\frac{2c(-2ad+bc)}{5a^2x^{\frac{5}{2}}}+\frac{b^{\frac{1}{4}}(-ad+bc)^2\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{13}{4}}}$$
$$-\frac{b^{\frac{1}{4}}(-ad+bc)^2\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{13}{4}}}$$
$$-\frac{b^{\frac{1}{4}}(-ad+bc)^2\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{13}{4}}}$$
$$+\frac{b^{\frac{1}{4}}(-ad+bc)^2\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{13}{4}}}-\frac{2(-ad+bc)^2}{a^3\sqrt{x}}$$

command

```
integrate((d*x**2+c)**2/x**(11/2)/(b*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$c^2\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{13}{2}}} & \text{for}\ a=0\wedge b=0\\ -\frac{2}{13bx^{\frac{13}{2}}} & \text{for}\ a=0\\ -\frac{2}{9ax^{\frac{9}{2}}} & \text{for}\ b=0\\ -\frac{2}{9ax^{\frac{9}{2}}}+\frac{2b}{5a^2x^{\frac{5}{2}}}-\frac{b^2\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a^3\sqrt[4]{-\frac{a}{b}}}+\frac{b^2\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a^3\sqrt[4]{-\frac{a}{b}}}-\frac{b^2\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a^3\sqrt[4]{-\frac{a}{b}}}-\frac{2b^2}{a^3\sqrt{x}} & \text{otherwise}\end{cases}\right)$$

$$+2cd\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{9}{2}}} & \text{for}\ a=0\wedge b=0\\ -\frac{2}{9bx^{\frac{9}{2}}} & \text{for}\ a=0\\ -\frac{2}{5ax^{\frac{5}{2}}} & \text{for}\ b=0\\ -\frac{2}{5ax^{\frac{5}{2}}}+\frac{b\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a^2\sqrt[4]{-\frac{a}{b}}}-\frac{b\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a^2\sqrt[4]{-\frac{a}{b}}}+\frac{b\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a^2\sqrt[4]{-\frac{a}{b}}}+\frac{2b}{a^2\sqrt{x}} & \text{otherwise}\end{cases}\right)$$

$$+d^2\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{5}{2}}} & \text{for}\ a=0\wedge b=0\\ -\frac{2}{5bx^{\frac{5}{2}}} & \text{for}\ a=0\\ -\frac{2}{a\sqrt{x}} & \text{for}\ b=0\\ -\frac{\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a\sqrt[4]{-\frac{a}{b}}}+\frac{\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a\sqrt[4]{-\frac{a}{b}}}-\frac{\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a\sqrt[4]{-\frac{a}{b}}}-\frac{2}{a\sqrt{x}} & \text{otherwise}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.10 Problem number 427

$$\int \frac{x^{3/2}(a+bx^2)^2}{(c+dx^2)^2}\,dx$$

Optimal antiderivative

$$\frac{2b^2x^{\frac{5}{2}}}{5d^2}+\frac{(-ad+bc)^2\,x^{\frac{5}{2}}}{2c\,d^2\,(d\,x^2+c)}-\frac{(-ad+bc)\,(-ad+9bc)\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{8c^{\frac{3}{4}}d^{\frac{13}{4}}}$$
$$+\frac{(-ad+bc)\,(-ad+9bc)\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{8c^{\frac{3}{4}}d^{\frac{13}{4}}}$$
$$-\frac{(-ad+bc)\,(-ad+9bc)\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16c^{\frac{3}{4}}d^{\frac{13}{4}}}$$
$$+\frac{(-ad+bc)\,(-ad+9bc)\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16c^{\frac{3}{4}}d^{\frac{13}{4}}}$$
$$-\frac{(-ad+bc)\,(-ad+9bc)\,\sqrt{x}}{2c\,d^3}$$

command

```
integrate(x**(3/2)*(b*x**2+a)**2/(d*x**2+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.11 Problem number 430

$$\int \frac{(a+bx^2)^2}{x^{3/2}\,(c+dx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{(5a^2d^2-2abcd+b^2c^2)\,x^{\frac{3}{2}}}{2c^2d\,(d\,x^2+c)}-\frac{(-ad+bc)\,(5ad+3bc)\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{8c^{\frac{9}{4}}d^{\frac{7}{4}}}+\frac{(-ad+bc)\,(5ad+3bc)\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{8c^{\frac{9}{4}}d^{\frac{7}{4}}}+\frac{(-ad+bc)\,(5ad+3bc)\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16c^{\frac{9}{4}}d^{\frac{7}{4}}}-\frac{(-ad+bc)\,(5ad+3bc)\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16c^{\frac{9}{4}}d^{\frac{7}{4}}}-\frac{2a^2}{c\,(d\,x^2+c)\,\sqrt{x}}$$

command

```
integrate((b*x**2+a)**2/x**(3/2)/(d*x**2+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.12 Problem number 431

$$\int \frac{(a+bx^2)^2}{x^{5/2}\,(c+dx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{2a^2}{3c\,x^{\frac{3}{2}}\,(d\,x^2+c)}-\frac{(-ad+bc)\,(7ad+bc)\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{8c^{\frac{11}{4}}d^{\frac{5}{4}}}+\frac{(-ad+bc)\,(7ad+bc)\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{8c^{\frac{11}{4}}d^{\frac{5}{4}}}-\frac{(-ad+bc)\,(7ad+bc)\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16c^{\frac{11}{4}}d^{\frac{5}{4}}}+\frac{(-ad+bc)\,(7ad+bc)\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16c^{\frac{11}{4}}d^{\frac{5}{4}}}-\frac{(7a^2d^2-6abcd+3b^2c^2)\,\sqrt{x}}{6c^2d\,(d\,x^2+c)}$$

command

```
integrate((b*x**2+a)**2/x**(5/2)/(d*x**2+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.13 Problem number 435

$$\int \frac{x^{3/2}(a+bx^2)^2}{(c+dx^2)^3}\,dx$$

Optimal antiderivative

$$\frac{(-ad+bc)^2 x^{\frac{5}{2}}}{4c\,d^2\,(d\,x^2+c)^2}-\frac{(-ad+bc)\,(3ad+13bc)\,x^{\frac{5}{2}}}{16c^2d^2\,(d\,x^2+c)}$$
$$+\frac{(-3a^2d^2-10abcd+45b^2c^2)\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{64c^{\frac{7}{4}}d^{\frac{13}{4}}}$$
$$-\frac{(-3a^2d^2-10abcd+45b^2c^2)\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{64c^{\frac{7}{4}}d^{\frac{13}{4}}}$$
$$+\frac{(-3a^2d^2-10abcd+45b^2c^2)\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128c^{\frac{7}{4}}d^{\frac{13}{4}}}$$
$$-\frac{(-3a^2d^2-10abcd+45b^2c^2)\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128c^{\frac{7}{4}}d^{\frac{13}{4}}}$$
$$-\frac{\left(10ab-\frac{45b^2c}{d}+\frac{3a^2d}{c}\right)\sqrt{x}}{16c\,d^2}$$

command

```
integrate(x**(3/2)*(b*x**2+a)**2/(d*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.14 Problem number 436

$$\int \frac{\sqrt{x}\,(a+bx^2)^2}{(c+dx^2)^3}\,dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{(-ad+bc)^2 x^{\frac{3}{2}}}{4c\,d^2\,(d\,x^2+c)^2}-\frac{(-ad+bc)\,(5ad+11bc)\,x^{\frac{3}{2}}}{16c^2d^2\,(d\,x^2+c)}\\
&-\frac{(5a^2d^2+6abcd+21b^2c^2)\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{64c^{\frac{9}{4}}d^{\frac{11}{4}}}\\
&+\frac{(5a^2d^2+6abcd+21b^2c^2)\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{64c^{\frac{9}{4}}d^{\frac{11}{4}}}\\
&+\frac{(5a^2d^2+6abcd+21b^2c^2)\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128c^{\frac{9}{4}}d^{\frac{11}{4}}}\\
&-\frac{(5a^2d^2+6abcd+21b^2c^2)\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128c^{\frac{9}{4}}d^{\frac{11}{4}}}
\end{aligned}$$

command

```
integrate((b*x**2+a)**2*x**(1/2)/(d*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}
&\frac{4abx^{\frac{3}{2}}}{4c^2d+4cd^2x^2}+\frac{4ab\operatorname{RootSum}\left(65536t^4c^5d^3+1,\left(t\mapsto t\log\left(4096t^3c^4d^2+\sqrt{x}\right)\right)\right)}{d}\\
&-\frac{4b^2cx^{\frac{3}{2}}}{4c^2d^2+4cd^3x^2}-\frac{4b^2c\operatorname{RootSum}\left(65536t^4c^5d^3+1,\left(t\mapsto t\log\left(4096t^3c^4d^2+\sqrt{x}\right)\right)\right)}{d^2}\\
&+\frac{2b^2\operatorname{RootSum}\left(256t^4cd^3+1,\left(t\mapsto t\log\left(64t^3cd^2+\sqrt{x}\right)\right)\right)}{d^2}\\
&+\frac{18cx^{\frac{3}{2}}(ad-bc)^2}{32c^4d^2+64c^3d^3x^2+32c^2d^4x^4}+\frac{10x^{\frac{7}{2}}(ad-bc)^2}{32c^4d+64c^3d^2x^2+32c^2d^3x^4}\\
&+\frac{2(ad-bc)^2\operatorname{RootSum}\left(268435456t^4c^9d^3+625,\left(t\mapsto t\log\left(\frac{2097152t^3c^7d^2}{125}+\sqrt{x}\right)\right)\right)}{d^2}
\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.15 Problem number 437

$$\int \frac{(a+bx^2)^2}{\sqrt{x}\,(c+dx^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{(21a^2d^2+6abcd+5b^2c^2)\arctan\left(1-\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{64c^{\frac{11}{4}}d^{\frac{9}{4}}} + \frac{(21a^2d^2+6abcd+5b^2c^2)\arctan\left(1+\frac{d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{c^{\frac{1}{4}}}\right)\sqrt{2}}{64c^{\frac{11}{4}}d^{\frac{9}{4}}} - \frac{(21a^2d^2+6abcd+5b^2c^2)\ln\left(\sqrt{c}+x\sqrt{d}-c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128c^{\frac{11}{4}}d^{\frac{9}{4}}} + \frac{(21a^2d^2+6abcd+5b^2c^2)\ln\left(\sqrt{c}+x\sqrt{d}+c^{\frac{1}{4}}d^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{128c^{\frac{11}{4}}d^{\frac{9}{4}}} + \frac{(-ad+bc)^2\sqrt{x}}{4c\,d^2\,(d\,x^2+c)^2} - \frac{(-ad+bc)\,(7ad+9bc)\sqrt{x}}{16c^2d^2\,(d\,x^2+c)}$$

command

```
integrate((b*x**2+a)**2/(d*x**2+c)**3/x**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.16 Problem number 441

$$\int \frac{x^{5/2}(c+dx^2)^3}{a+bx^2}\,dx$$

Optimal antiderivative

$$\frac{2(-ad+bc)^3 x^{\frac{3}{2}}}{3b^4}+\frac{2d\left(a^2d^2-3abcd+3b^2c^2\right) x^{\frac{7}{2}}}{7b^3}+\frac{2d^2(-ad+3bc)\, x^{\frac{11}{2}}}{11b^2}$$
$$+\frac{2d^3x^{\frac{15}{2}}}{15b}+\frac{a^{\frac{3}{4}}(-ad+bc)^3 \arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2b^{\frac{19}{4}}}$$
$$-\frac{a^{\frac{3}{4}}(-ad+bc)^3 \arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2b^{\frac{19}{4}}}$$
$$-\frac{a^{\frac{3}{4}}(-ad+bc)^3 \ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4b^{\frac{19}{4}}}$$
$$+\frac{a^{\frac{3}{4}}(-ad+bc)^3 \ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4b^{\frac{19}{4}}}$$

command

```
integrate(x**(5/2)*(d*x**2+c)**3/(b*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(\frac{2c^3x^{\frac{3}{2}}}{3}+\frac{6c^2dx^{\frac{7}{2}}}{7}+\frac{6cd^2x^{\frac{11}{2}}}{11}+\frac{2d^3x^{\frac{15}{2}}}{15}\right) \\ \frac{\frac{2c^3x^{\frac{7}{2}}}{7}+\frac{6c^2dx^{\frac{11}{2}}}{11}+\frac{2cd^2x^{\frac{15}{2}}}{5}+\frac{2d^3x^{\frac{19}{2}}}{19}}{a} \\ \frac{\frac{2c^3x^{\frac{3}{2}}}{3}+\frac{6c^2dx^{\frac{7}{2}}}{7}+\frac{6cd^2x^{\frac{11}{2}}}{11}+\frac{2d^3x^{\frac{15}{2}}}{15}}{b} \\ -\frac{2a^3d^3x^{\frac{3}{2}}}{3b^4}-\frac{a^3d^3\left(-\frac{a}{b}\right)^{\frac{3}{4}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2b^4}+\frac{a^3d^3\left(-\frac{a}{b}\right)^{\frac{3}{4}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2b^4}-\frac{a^3d^3\left(-\frac{a}{b}\right)^{\frac{3}{4}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{b^4}+\frac{2a^2cd^2x^{\frac{3}{2}}}{b^3}+\cdots \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.17 Problem number 442

$$\int \frac{x^{3/2}\left(c+dx^2\right)^3}{a+bx^2}\,dx$$

Optimal antiderivative

$$\frac{2d(a^2d^2-3abcd+3b^2c^2)\,x^{\frac{5}{2}}}{5b^3}+\frac{2d^2(-ad+3bc)\,x^{\frac{9}{2}}}{9b^2}+\frac{2d^3x^{\frac{13}{2}}}{13b}+\frac{a^{\frac{1}{4}}(-ad+bc)^3\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2b^{\frac{17}{4}}}-\frac{a^{\frac{1}{4}}(-ad+bc)^3\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2b^{\frac{17}{4}}}+\frac{a^{\frac{1}{4}}(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4b^{\frac{17}{4}}}-\frac{a^{\frac{1}{4}}(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4b^{\frac{17}{4}}}+\frac{2(-ad+bc)^3\sqrt{x}}{b^4}$$

command

```
integrate(x**(3/2)*(d*x**2+c)**3/(b*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\tilde{\infty}\left(2c^3\sqrt{x}+\frac{6c^2dx^{\frac{5}{2}}}{5}+\frac{2cd^2x^{\frac{9}{2}}}{3}+\frac{2d^3x^{\frac{13}{2}}}{13}\right) \\ \frac{\frac{2c^3x^{\frac{5}{2}}}{5}+\frac{2c^2dx^{\frac{9}{2}}}{3}+\frac{6cd^2x^{\frac{13}{2}}}{13}+\frac{2d^3x^{\frac{17}{2}}}{17}}{a} \\ \frac{2c^3\sqrt{x}+\frac{6c^2dx^{\frac{5}{2}}}{5}+\frac{2cd^2x^{\frac{9}{2}}}{3}+\frac{2d^3x^{\frac{13}{2}}}{13}}{b} \\ -\frac{2a^3d^3\sqrt{x}}{b^4}-\frac{a^3d^3\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2b^4}+\frac{a^3d^3\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2b^4}+\frac{a^3d^3\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{b^4}+\frac{6a^2cd^2\sqrt{x}}{b^3}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.18 Problem number 447

$$\int\frac{(c+dx^2)^3}{x^{7/2}\,(a+bx^2)}\,dx$$

Optimal antiderivative

$$-\frac{2c^3}{5a\,x^{\frac{5}{2}}}+\frac{2d^3x^{\frac{3}{2}}}{3b}-\frac{(-ad+bc)^3\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{9}{4}}b^{\frac{7}{4}}}+\frac{(-ad+bc)^3\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{9}{4}}b^{\frac{7}{4}}}+\frac{(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{9}{4}}b^{\frac{7}{4}}}-\frac{(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{9}{4}}b^{\frac{7}{4}}}+\frac{2c^2(-3ad+bc)}{a^2\sqrt{x}}$$

command

```
integrate((d*x**2+c)**3/x**(7/2)/(b*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$c^3\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{9}{2}}} & \text{for } a=0\wedge b=0\\ -\frac{2}{9bx^{\frac{9}{2}}} & \text{for } a=0\\ -\frac{2}{5ax^{\frac{5}{2}}} & \text{for } b=0\\ -\frac{2}{5ax^{\frac{5}{2}}}+\frac{b\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a^2\sqrt[4]{-\frac{a}{b}}}-\frac{b\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a^2\sqrt[4]{-\frac{a}{b}}}+\frac{b\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a^2\sqrt[4]{-\frac{a}{b}}}+\frac{2b}{a^2\sqrt{x}} & \text{otherwise}\end{cases}\right)+3c^2d\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{5}{2}}} & \text{for } a=0\wedge b=0\\ -\frac{2}{5bx^{\frac{5}{2}}} & \text{for } a=0\\ -\frac{2}{a\sqrt{x}} & \text{for } b=0\\ -\frac{\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a\sqrt[4]{-\frac{a}{b}}}+\frac{\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a\sqrt[4]{-\frac{a}{b}}}-\frac{\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a\sqrt[4]{-\frac{a}{b}}}-\frac{2}{a\sqrt{x}} & \text{otherwise}\end{cases}\right)+6cd^2\operatorname{RootSum}\left(256t^4ab^3+1,\left(t\mapsto t\log\left(64t^3ab^2+\sqrt{x}\right)\right)\right)+d^3\left(\begin{cases}\tilde{\infty}x^{\frac{3}{2}} & \text{for } a=0\wedge b=0\\ \frac{2x^{\frac{7}{2}}}{7a} & \text{for } b=0\\ \frac{2x^{\frac{3}{2}}}{3b} & \text{for } a=0\\ -\frac{a\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2b^2\sqrt[4]{-\frac{a}{b}}}+\frac{a\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2b^2\sqrt[4]{-\frac{a}{b}}}-\frac{a\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{b^2\sqrt[4]{-\frac{a}{b}}}+\frac{2x^{\frac{3}{2}}}{3b} & \text{otherwise}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.19 Problem number 448

$$\int \frac{(c+dx^2)^3}{x^{9/2}(a+bx^2)}\,dx$$

Optimal antiderivative

$$\begin{aligned}&-\frac{2c^3}{7a\,x^{\frac{7}{2}}}+\frac{2c^2(-3ad+bc)}{3a^2x^{\frac{3}{2}}}-\frac{(-ad+bc)^3\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{11}{4}}b^{\frac{5}{4}}}\\&+\frac{(-ad+bc)^3\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{11}{4}}b^{\frac{5}{4}}}\\&-\frac{(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{11}{4}}b^{\frac{5}{4}}}\\&+\frac{(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{11}{4}}b^{\frac{5}{4}}}+\frac{2d^3\sqrt{x}}{b}\end{aligned}$$

command

```
integrate((d*x**2+c)**3/x**(9/2)/(b*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\tilde{\infty}\left(-\frac{2c^3}{11x^{\frac{11}{2}}}-\frac{6c^2d}{7x^{\frac{7}{2}}}-\frac{2cd^2}{x^{\frac{3}{2}}}+2d^3\sqrt{x}\right)\\ \frac{-\frac{2c^3}{11x^{\frac{11}{2}}}-\frac{6c^2d}{7x^{\frac{7}{2}}}-\frac{2cd^2}{x^{\frac{3}{2}}}+2d^3\sqrt{x}}{b}\\ \frac{-\frac{2c^3}{7x^{\frac{7}{2}}}-\frac{2c^2d}{x^{\frac{3}{2}}}+6cd^2\sqrt{x}+\frac{2d^3x^{\frac{5}{2}}}{5}}{a}\\ \frac{2d^3\sqrt{x}}{b}+\frac{d^3\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2b}-\frac{d^3\sqrt[4]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2b}-\frac{d^3\sqrt[4]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{b}-\frac{2c^3}{7ax^{\frac{7}{2}}}-\frac{2c^2d}{ax^{\frac{3}{2}}}-3cd^2\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.20 Problem number 449

$$\int \frac{(c+dx^2)^3}{x^{11/2}(a+bx^2)}\,dx$$

Optimal antiderivative

$$-\frac{2c^3}{9a\,x^{\frac{9}{2}}}+\frac{2c^2(-3ad+bc)}{5a^2x^{\frac{5}{2}}}+\frac{(-ad+bc)^3\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{13}{4}}b^{\frac{3}{4}}}$$
$$-\frac{(-ad+bc)^3\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{2a^{\frac{13}{4}}b^{\frac{3}{4}}}$$
$$-\frac{(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{13}{4}}b^{\frac{3}{4}}}$$
$$+\frac{(-ad+bc)^3\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4a^{\frac{13}{4}}b^{\frac{3}{4}}}-\frac{2c(3a^2d^2-3abcd+b^2c^2)}{a^3\sqrt{x}}$$

command

```
integrate((d*x**2+c)**3/x**(11/2)/(b*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$c^3\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{13}{2}}} & \text{for } a=0\wedge b=0\\ -\frac{2}{13bx^{\frac{13}{2}}} & \text{for } a=0\\ -\frac{2}{9ax^{\frac{9}{2}}} & \text{for } b=0\\ -\frac{2}{9ax^{\frac{9}{2}}}+\frac{2b}{5a^2x^{\frac{5}{2}}}-\frac{b^2\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a^3\sqrt[4]{-\frac{a}{b}}}+\frac{b^2\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a^3\sqrt[4]{-\frac{a}{b}}}-\frac{b^2\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a^3\sqrt[4]{-\frac{a}{b}}}-\frac{2b^2}{a^3\sqrt{x}} & \text{otherwise}\end{cases}\right)$$
$$+3c^2d\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{9}{2}}} & \text{for } a=0\wedge b=0\\ -\frac{2}{9bx^{\frac{9}{2}}} & \text{for } a=0\\ -\frac{2}{5ax^{\frac{5}{2}}} & \text{for } b=0\\ -\frac{2}{5ax^{\frac{5}{2}}}+\frac{b\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a^2\sqrt[4]{-\frac{a}{b}}}-\frac{b\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a^2\sqrt[4]{-\frac{a}{b}}}+\frac{b\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a^2\sqrt[4]{-\frac{a}{b}}}+\frac{2b}{a^2\sqrt{x}} & \text{otherwise}\end{cases}\right)$$
$$+3cd^2\left(\begin{cases}\frac{\tilde{\infty}}{x^{\frac{5}{2}}} & \text{for } a=0\wedge b=0\\ -\frac{2}{5bx^{\frac{5}{2}}} & \text{for } a=0\\ -\frac{2}{a\sqrt{x}} & \text{for } b=0\\ -\frac{\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{b}}\right)}{2a\sqrt[4]{-\frac{a}{b}}}+\frac{\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{b}}\right)}{2a\sqrt[4]{-\frac{a}{b}}}-\frac{\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{b}}}\right)}{a\sqrt[4]{-\frac{a}{b}}}-\frac{2}{a\sqrt{x}} & \text{otherwise}\end{cases}\right)$$
$$+2d^3\operatorname{RootSum}\left(256t^4ab^3+1,\left(t\mapsto t\log\left(64t^3ab^2+\sqrt{x}\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.21 Problem number 454

$$\int\frac{x^{3/2}(c+dx^2)^3}{(a+bx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{(-13ad+bc)\,(-ad+bc)^2\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{3}{4}}b^{\frac{17}{4}}}+\frac{(-13ad+bc)\,(-ad+bc)^2\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{3}{4}}b^{\frac{17}{4}}}-\frac{(-13ad+bc)\,(-ad+bc)^2\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{3}{4}}b^{\frac{17}{4}}}+\frac{(-13ad+bc)\,(-ad+bc)^2\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{3}{4}}b^{\frac{17}{4}}}+\frac{d\left(585a^2d^2-1098abcd+497b^2c^2\right)\sqrt{x}}{90b^4}+\frac{d(-117ad+113bc)\left(d\,x^2+c\right)\sqrt{x}}{90b^3}+\frac{13d\left(d\,x^2+c\right)^2\sqrt{x}}{18b^2}-\frac{\left(d\,x^2+c\right)^3\sqrt{x}}{2b\left(b\,x^2+a\right)}$$

command

```
integrate(x**(3/2)*(d*x**2+c)**3/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.22 Problem number 456

$$\int\frac{\left(c+dx^2\right)^3}{\sqrt{x}\,\left(a+bx^2\right)^2}\,dx$$

Optimal antiderivative

$$\frac{2d^3x^{\frac{5}{2}}}{5b^2} - \frac{3(-ad+bc)^2\,(3ad+bc)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{7}{4}}b^{\frac{13}{4}}} + \frac{3(-ad+bc)^2\,(3ad+bc)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{7}{4}}b^{\frac{13}{4}}} - \frac{3(-ad+bc)^2\,(3ad+bc)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{7}{4}}b^{\frac{13}{4}}} + \frac{3(-ad+bc)^2\,(3ad+bc)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{7}{4}}b^{\frac{13}{4}}} + \frac{2d^2(-2ad+3bc)\sqrt{x}}{b^3} + \frac{(-ad+bc)^3\sqrt{x}}{2a\,b^3\,(b\,x^2+a)}$$

command

```
integrate((d*x**2+c)**3/(b*x**2+a)**2/x**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.23 Problem number 457

$$\int \frac{(c+dx^2)^3}{x^{3/2}\,(a+bx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{d^2(-7ad+3bc)\,x^{\frac{3}{2}}}{6a\,b^2} + \frac{(-ad+bc)^2\,(7ad+5bc)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{9}{4}}b^{\frac{11}{4}}} - \frac{(-ad+bc)^2\,(7ad+5bc)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{9}{4}}b^{\frac{11}{4}}} - \frac{(-ad+bc)^2\,(7ad+5bc)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{9}{4}}b^{\frac{11}{4}}} + \frac{(-ad+bc)^2\,(7ad+5bc)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{9}{4}}b^{\frac{11}{4}}} - \frac{c^2(-ad+5bc)}{2a^2b\sqrt{x}} + \frac{(-ad+bc)\,(d\,x^2+c)^2}{2ab\,(b\,x^2+a)\,\sqrt{x}}$$

command

```
integrate((d*x**2+c)**3/x**(3/2)/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.24 Problem number 458

$$\int \frac{(c+dx^2)^3}{x^{5/2}(a+bx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{c^2(-3ad+7bc)}{6a^2b\,x^{\frac{3}{2}}}+\frac{(-ad+bc)\,(d\,x^2+c)^2}{2ab\,x^{\frac{3}{2}}\,(b\,x^2+a)}$$
$$+\frac{(-ad+bc)^2\,(5ad+7bc)\arctan\left(1-\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{11}{4}}b^{\frac{9}{4}}}$$
$$-\frac{(-ad+bc)^2\,(5ad+7bc)\arctan\left(1+\frac{b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\sqrt{2}}{8a^{\frac{11}{4}}b^{\frac{9}{4}}}$$
$$+\frac{(-ad+bc)^2\,(5ad+7bc)\ln\left(\sqrt{a}+x\sqrt{b}-a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{11}{4}}b^{\frac{9}{4}}}$$
$$-\frac{(-ad+bc)^2\,(5ad+7bc)\ln\left(\sqrt{a}+x\sqrt{b}+a^{\frac{1}{4}}b^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{16a^{\frac{11}{4}}b^{\frac{9}{4}}}-\frac{d^2(-5ad+bc)\sqrt{x}}{2a\,b^2}$$

command

```
integrate((d*x**2+c)**3/x**(5/2)/(b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

12.25 Problem number 518

$$\int \frac{\sqrt{a+bx^2}\,(A+Bx^2)}{x^9}\,dx$$

Optimal antiderivative

$$-\frac{A(b\,x^2+a)^{\frac{3}{2}}}{8a\,x^8}+\frac{b^3(5Ab-8Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{128a^{\frac{7}{2}}}+\frac{(5Ab-8Ba)\,\sqrt{b\,x^2+a}}{48a\,x^6}+\frac{b(5Ab-8Ba)\,\sqrt{b\,x^2+a}}{192a^2x^4}-\frac{b^2(5Ab-8Ba)\,\sqrt{b\,x^2+a}}{128a^3x^2}$$

command

```
integrate((B*x**2+A)*(b*x**2+a)**(1/2)/x**9,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{Aa}{8\sqrt{b}\,x^9\sqrt{\frac{a}{bx^2}+1}}-\frac{7A\sqrt{b}}{48x^7\sqrt{\frac{a}{bx^2}+1}}+\frac{Ab^{\frac{3}{2}}}{192ax^5\sqrt{\frac{a}{bx^2}+1}}-\frac{5Ab^{\frac{5}{2}}}{384a^2x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{5Ab^{\frac{7}{2}}}{128a^3x\sqrt{\frac{a}{bx^2}+1}}+\frac{5Ab^4\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{128a^{\frac{7}{2}}}-\frac{Ba}{6\sqrt{b}\,x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{5B\sqrt{b}}{24x^5\sqrt{\frac{a}{bx^2}+1}}+\frac{Bb^{\frac{3}{2}}}{48ax^3\sqrt{\frac{a}{bx^2}+1}}+\frac{Bb^{\frac{5}{2}}}{16a^2x\sqrt{\frac{a}{bx^2}+1}}-\frac{Bb^3\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{16a^{\frac{5}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.26 Problem number 520

$$\int \frac{\sqrt{a+bx^2}\,(A+Bx^2)}{x^{11}}\,dx$$

Optimal antiderivative

$$-\frac{A(b\,x^2+a)^{\frac{3}{2}}}{10a\,x^{10}}-\frac{b^4(7Ab-10Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{256a^{\frac{9}{2}}}+\frac{(7Ab-10Ba)\,\sqrt{b\,x^2+a}}{80a\,x^8}+\frac{b(7Ab-10Ba)\,\sqrt{b\,x^2+a}}{480a^2x^6}-\frac{b^2(7Ab-10Ba)\,\sqrt{b\,x^2+a}}{384a^3x^4}+\frac{b^3(7Ab-10Ba)\,\sqrt{b\,x^2+a}}{256a^4x^2}$$

command

```
integrate((B*x**2+A)*(b*x**2+a)**(1/2)/x**11,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{Aa}{10\sqrt{b}\,x^{11}\sqrt{\frac{a}{bx^2}+1}}-\frac{9A\sqrt{b}}{80x^9\sqrt{\frac{a}{bx^2}+1}}+\frac{Ab^{\frac{3}{2}}}{480ax^7\sqrt{\frac{a}{bx^2}+1}}-\frac{7Ab^{\frac{5}{2}}}{1920a^2x^5\sqrt{\frac{a}{bx^2}+1}}+\frac{7Ab^{\frac{7}{2}}}{768a^3x^3\sqrt{\frac{a}{bx^2}+1}}+\frac{7Ab^{\frac{9}{2}}}{256a^4x\sqrt{\frac{a}{bx^2}+1}}-\frac{7Ab^5\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{256a^{\frac{9}{2}}}-\frac{Ba}{8\sqrt{b}\,x^9\sqrt{\frac{a}{bx^2}+1}}-\frac{7B\sqrt{b}}{48x^7\sqrt{\frac{a}{bx^2}+1}}+\frac{Bb^{\frac{3}{2}}}{192ax^5\sqrt{\frac{a}{bx^2}+1}}-\frac{5Bb^{\frac{5}{2}}}{384a^2x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{5Bb^{\frac{7}{2}}}{128a^3x\sqrt{\frac{a}{bx^2}+1}}+\frac{5Bb^4\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{128a^{\frac{7}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.27 Problem number 533

$$\int\frac{(a+bx^2)^{3/2}(A+Bx^2)}{x^7}\,dx$$

Optimal antiderivative

$$\frac{(Ab-6Ba)\left(b\,x^2+a\right)^{\frac{3}{2}}}{24a\,x^4}-\frac{A\left(b\,x^2+a\right)^{\frac{5}{2}}}{6a\,x^6}+\frac{b^2(Ab-6Ba)\operatorname{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{16a^{\frac{3}{2}}}+\frac{b(Ab-6Ba)\sqrt{b\,x^2+a}}{16a\,x^2}$$

command

```
integrate((b*x**2+a)**(3/2)*(B*x**2+A)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{Aa^2}{6\sqrt{b}\,x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{11Aa\sqrt{b}}{24x^5\sqrt{\frac{a}{bx^2}+1}}-\frac{17Ab^{\frac{3}{2}}}{48x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{Ab^{\frac{5}{2}}}{16ax\sqrt{\frac{a}{bx^2}+1}}+\frac{Ab^3\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{16a^{\frac{3}{2}}}-\frac{Ba^2}{4\sqrt{b}\,x^5\sqrt{\frac{a}{bx^2}+1}}-\frac{3Ba\sqrt{b}}{8x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{Bb^{\frac{3}{2}}\sqrt{\frac{a}{bx^2}+1}}{2x}-\frac{Bb^{\frac{3}{2}}}{8x\sqrt{\frac{a}{bx^2}+1}}-\frac{3Bb^2\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{8\sqrt{a}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.28 Problem number 535

$$\int\frac{(a+bx^2)^{3/2}(A+Bx^2)}{x^9}\,dx$$

Optimal antiderivative

$$\frac{(3Ab-8Ba)\left(b\,x^2+a\right)^{\frac{3}{2}}}{48a\,x^6}-\frac{A\left(b\,x^2+a\right)^{\frac{5}{2}}}{8a\,x^8}-\frac{b^3(3Ab-8Ba)\operatorname{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{128a^{\frac{5}{2}}}+\frac{b(3Ab-8Ba)\sqrt{b\,x^2+a}}{64a\,x^4}+\frac{b^2(3Ab-8Ba)\sqrt{b\,x^2+a}}{128a^2x^2}$$

command

```
integrate((b*x**2+a)**(3/2)*(B*x**2+A)/x**9,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{Aa^2}{8\sqrt{b}\,x^9\sqrt{\frac{a}{bx^2}+1}}-\frac{5Aa\sqrt{b}}{16x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{13Ab^{\frac{3}{2}}}{64x^5\sqrt{\frac{a}{bx^2}+1}}+\frac{Ab^{\frac{5}{2}}}{128ax^3\sqrt{\frac{a}{bx^2}+1}}+\frac{3Ab^{\frac{7}{2}}}{128a^2x\sqrt{\frac{a}{bx^2}+1}}-\frac{3Ab^4\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{128a^{\frac{5}{2}}}-\frac{Ba^2}{6\sqrt{b}\,x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{11Ba\sqrt{b}}{24x^5\sqrt{\frac{a}{bx^2}+1}}-\frac{17Bb^{\frac{3}{2}}}{48x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{Bb^{\frac{5}{2}}}{16ax\sqrt{\frac{a}{bx^2}+1}}+\frac{Bb^3\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{16a^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.29 Problem number 550

$$\int \frac{(a+bx^2)^{5/2}(A+Bx^2)}{x^7}\,dx$$

Optimal antiderivative

$$-\frac{5b(Ab+6Ba)\left(b\,x^2+a\right)^{\frac{3}{2}}}{48a\,x^2}-\frac{(Ab+6Ba)\left(b\,x^2+a\right)^{\frac{5}{2}}}{24a\,x^4}-\frac{A\left(b\,x^2+a\right)^{\frac{7}{2}}}{6a\,x^6} - \frac{5b^2(Ab+6Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{16\sqrt{a}}+\frac{5b^2(Ab+6Ba)\sqrt{b\,x^2+a}}{16a}$$

command

```
integrate((b*x**2+a)**(5/2)*(B*x**2+A)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{Aa^3}{6\sqrt{b}\,x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{17Aa^2\sqrt{b}}{24x^5\sqrt{\frac{a}{bx^2}+1}}-\frac{35Aab^{\frac{3}{2}}}{48x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{Ab^{\frac{5}{2}}\sqrt{\frac{a}{bx^2}+1}}{2x} - \frac{3Ab^{\frac{5}{2}}}{16x\sqrt{\frac{a}{bx^2}+1}}-\frac{5Ab^3\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{16\sqrt{a}}-\frac{15B\sqrt{a}\,b^2\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{8} - \frac{Ba^3}{4\sqrt{b}\,x^5\sqrt{\frac{a}{bx^2}+1}}-\frac{3Ba^2\sqrt{b}}{8x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{Bab^{\frac{3}{2}}\sqrt{\frac{a}{bx^2}+1}}{x}+\frac{7Bab^{\frac{3}{2}}}{8x\sqrt{\frac{a}{bx^2}+1}}+\frac{Bb^{\frac{5}{2}}x}{\sqrt{\frac{a}{bx^2}+1}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.30 Problem number 552

$$\int \frac{(a+bx^2)^{5/2}(A+Bx^2)}{x^9}\,dx$$

Optimal antiderivative

$$\frac{5b(Ab-8Ba)\left(b\,x^2+a\right)^{\frac{3}{2}}}{192a\,x^4}+\frac{(Ab-8Ba)\left(b\,x^2+a\right)^{\frac{5}{2}}}{48a\,x^6}-\frac{A\left(b\,x^2+a\right)^{\frac{7}{2}}}{8a\,x^8} +\frac{5b^3(Ab-8Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{128a^{\frac{3}{2}}}+\frac{5b^2(Ab-8Ba)\sqrt{b\,x^2+a}}{128a\,x^2}$$

command

```
integrate((b*x**2+a)**(5/2)*(B*x**2+A)/x**9,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{Aa^3}{8\sqrt{b}\,x^9\sqrt{\frac{a}{bx^2}+1}}-\frac{23Aa^2\sqrt{b}}{48x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{127Aab^{\frac{3}{2}}}{192x^5\sqrt{\frac{a}{bx^2}+1}}-\frac{133Ab^{\frac{5}{2}}}{384x^3\sqrt{\frac{a}{bx^2}+1}} -\frac{5Ab^{\frac{7}{2}}}{128ax\sqrt{\frac{a}{bx^2}+1}}+\frac{5Ab^4\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{128a^{\frac{3}{2}}}-\frac{Ba^3}{6\sqrt{b}\,x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{17Ba^2\sqrt{b}}{24x^5\sqrt{\frac{a}{bx^2}+1}} -\frac{35Bab^{\frac{3}{2}}}{48x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{Bb^{\frac{5}{2}}\sqrt{\frac{a}{bx^2}+1}}{2x}-\frac{3Bb^{\frac{5}{2}}}{16x\sqrt{\frac{a}{bx^2}+1}}-\frac{5Bb^3\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{16\sqrt{a}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.31 Problem number 603

$$\int \frac{(a+bx^2)^2\sqrt{c+dx^2}}{x^5}\,dx$$

Optimal antiderivative

$$-\frac{a^2\left(d\,x^2+c\right)^{\frac{3}{2}}}{4c\,x^4}-\frac{a(-ad+8bc)\left(d\,x^2+c\right)^{\frac{3}{2}}}{8c^2x^2} -\frac{\left(8b^2c^2+ad(-ad+8bc)\right)\mathrm{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)}{8c^{\frac{3}{2}}}+\frac{\left(8b^2c^2+ad(-ad+8bc)\right)\sqrt{d\,x^2+c}}{8c^2}$$

command

`integrate((b*x**2+a)**2*(d*x**2+c)**(1/2)/x**5,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2c}{4\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{3a^2\sqrt{d}}{8x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{a^2d^{\frac{3}{2}}}{8cx\sqrt{\frac{c}{dx^2}+1}}+\frac{a^2d^2\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{8c^{\frac{3}{2}}}-\frac{ab\sqrt{d}\,\sqrt{\frac{c}{dx^2}+1}}{x}-\frac{abd\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{\sqrt{c}}-b^2\sqrt{c}\,\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)+\frac{b^2c}{\sqrt{d}\,x\sqrt{\frac{c}{dx^2}+1}}+\frac{b^2\sqrt{d}\,x}{\sqrt{\frac{c}{dx^2}+1}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.32 Problem number 604

$$\int\frac{(a+bx^2)^2\sqrt{c+dx^2}}{x^7}\,dx$$

Optimal antiderivative

$$-\frac{a^2(d\,x^2+c)^{\frac{3}{2}}}{6c\,x^6}-\frac{a(-ad+4bc)\,(d\,x^2+c)^{\frac{3}{2}}}{8c^2x^4}-\frac{d(a^2d^2-4abcd+8b^2c^2)\operatorname{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)}{16c^{\frac{5}{2}}}-\frac{(a^2d^2-4abcd+8b^2c^2)\,\sqrt{d\,x^2+c}}{16c^2x^2}$$

command

`integrate((b*x**2+a)**2*(d*x**2+c)**(1/2)/x**7,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2c}{6\sqrt{d}\,x^7\sqrt{\frac{c}{dx^2}+1}}-\frac{5a^2\sqrt{d}}{24x^5\sqrt{\frac{c}{dx^2}+1}}+\frac{a^2d^{\frac{3}{2}}}{48cx^3\sqrt{\frac{c}{dx^2}+1}}+\frac{a^2d^{\frac{5}{2}}}{16c^2x\sqrt{\frac{c}{dx^2}+1}}-\frac{a^2d^3\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{16c^{\frac{5}{2}}}-\frac{abc}{2\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{3ab\sqrt{d}}{4x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{abd^{\frac{3}{2}}}{4cx\sqrt{\frac{c}{dx^2}+1}}+\frac{abd^2\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{4c^{\frac{3}{2}}}-\frac{b^2\sqrt{d}\,\sqrt{\frac{c}{dx^2}+1}}{2x}-\frac{b^2d\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{2\sqrt{c}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.33 Problem number 622

$$\int \frac{(a+bx^2)^2\,(c+dx^2)^{3/2}}{x^5}\,dx$$

Optimal antiderivative

$$\frac{(8b^2c^2+3ad(ad+8bc))\,(d\,x^2+c)^{\frac{3}{2}}}{24c^2}-\frac{a^2(d\,x^2+c)^{\frac{5}{2}}}{4c\,x^4}-\frac{a(ad+8bc)\,(d\,x^2+c)^{\frac{5}{2}}}{8c^2x^2} -\frac{(8b^2c^2+3ad(ad+8bc))\,\operatorname{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)}{8\sqrt{c}}+\frac{(8b^2c^2+3ad(ad+8bc))\,\sqrt{d\,x^2+c}}{8c}$$

command

```
integrate((b*x**2+a)**2*(d*x**2+c)**(3/2)/x**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2c^2}{4\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{3a^2c\sqrt{d}}{8x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{a^2d^{\frac{3}{2}}\sqrt{\frac{c}{dx^2}+1}}{2x} -\frac{a^2d^{\frac{3}{2}}}{8x\sqrt{\frac{c}{dx^2}+1}}-\frac{3a^2d^2\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{8\sqrt{c}}-3ab\sqrt{c}\,d\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right) -\frac{abc\sqrt{d}\,\sqrt{\frac{c}{dx^2}+1}}{x}+\frac{2abc\sqrt{d}}{x\sqrt{\frac{c}{dx^2}+1}}+\frac{2abd^{\frac{3}{2}}x}{\sqrt{\frac{c}{dx^2}+1}}-b^2c^{\frac{3}{2}}\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right) +\frac{b^2c^2}{\sqrt{d}\,x\sqrt{\frac{c}{dx^2}+1}}+\frac{b^2c\sqrt{d}\,x}{\sqrt{\frac{c}{dx^2}+1}}+b^2d\left(\begin{cases}\frac{\sqrt{c}\,x^2}{2} & \text{for } d=0\\ \frac{(c+dx^2)^{\frac{3}{2}}}{3d} & \text{otherwise}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.34 Problem number 624

$$\int \frac{(a+bx^2)^2\,(c+dx^2)^{3/2}}{x^7}\,dx$$

Optimal antiderivative

$$-\frac{(24b^2c^2+ad(-ad+12bc))\,(d\,x^2+c)^{\frac{3}{2}}}{48c^2x^2}-\frac{a^2(d\,x^2+c)^{\frac{5}{2}}}{6c\,x^6}-\frac{a(-ad+12bc)\,(d\,x^2+c)^{\frac{5}{2}}}{24c^2x^4}$$
$$-\frac{d(24b^2c^2+ad(-ad+12bc))\operatorname{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)}{16c^{\frac{3}{2}}}$$
$$+\frac{d(24b^2c^2+ad(-ad+12bc))\,\sqrt{d\,x^2+c}}{16c^2}$$

command

```
integrate((b*x**2+a)**2*(d*x**2+c)**(3/2)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2c^2}{6\sqrt{d}\,x^7\sqrt{\frac{c}{dx^2}+1}}-\frac{11a^2c\sqrt{d}}{24x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{17a^2d^{\frac{3}{2}}}{48x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{a^2d^{\frac{5}{2}}}{16cx\sqrt{\frac{c}{dx^2}+1}}$$
$$+\frac{a^2d^3\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{16c^{\frac{3}{2}}}-\frac{abc^2}{2\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{3abc\sqrt{d}}{4x^3\sqrt{\frac{c}{dx^2}+1}}$$
$$-\frac{abd^{\frac{3}{2}}\sqrt{\frac{c}{dx^2}+1}}{x}-\frac{abd^{\frac{3}{2}}}{4x\sqrt{\frac{c}{dx^2}+1}}-\frac{3abd^2\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{4\sqrt{c}}$$
$$-\frac{3b^2\sqrt{c}\,d\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{2}-\frac{b^2c\sqrt{d}\,\sqrt{\frac{c}{dx^2}+1}}{2x}+\frac{b^2c\sqrt{d}}{x\sqrt{\frac{c}{dx^2}+1}}+\frac{b^2d^{\frac{3}{2}}x}{\sqrt{\frac{c}{dx^2}+1}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.35 Problem number 633

$$\int \frac{(a+bx^2)^2 (c+dx^2)^{5/2}}{x^5}\,dx$$

Optimal antiderivative

$$\frac{(8b^2c^2+5ad(3ad+8bc))\,(d\,x^2+c)^{\frac{3}{2}}}{24c}+\frac{(8b^2c^2+5ad(3ad+8bc))\,(d\,x^2+c)^{\frac{5}{2}}}{40c^2} - \frac{a^2(d\,x^2+c)^{\frac{7}{2}}}{4c\,x^4}-\frac{a(3ad+8bc)\,(d\,x^2+c)^{\frac{7}{2}}}{8c^2x^2} - \frac{(8b^2c^2+5ad(3ad+8bc))\,\mathrm{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)\sqrt{c}}{8} + \frac{(8b^2c^2+5ad(3ad+8bc))\,\sqrt{d\,x^2+c}}{8}$$

command

```
integrate((b*x**2+a)**2*(d*x**2+c)**(5/2)/x**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{15a^2\sqrt{c}\,d^2\,\mathrm{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{8}-\frac{a^2c^3}{4\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{3a^2c^2\sqrt{d}}{8x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{a^2cd^{\frac{3}{2}}\sqrt{\frac{c}{dx^2}+1}}{x} + \frac{7a^2cd^{\frac{3}{2}}}{8x\sqrt{\frac{c}{dx^2}+1}}+\frac{a^2d^{\frac{5}{2}}x}{\sqrt{\frac{c}{dx^2}+1}}-5abc^{\frac{3}{2}}d\,\mathrm{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)-\frac{abc^2\sqrt{d}\,\sqrt{\frac{c}{dx^2}+1}}{x} + \frac{4abc^2\sqrt{d}}{x\sqrt{\frac{c}{dx^2}+1}}+\frac{4abcd^{\frac{3}{2}}x}{\sqrt{\frac{c}{dx^2}+1}}+2abd^2\left(\begin{cases}\frac{\sqrt{c}\,x^2}{2} & \text{for}\ d=0\\ \frac{(c+dx^2)^{\frac{3}{2}}}{3d} & \text{otherwise}\end{cases}\right)-b^2c^{\frac{5}{2}}\,\mathrm{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right) + \frac{b^2c^3}{\sqrt{d}\,x\sqrt{\frac{c}{dx^2}+1}}+\frac{b^2c^2\sqrt{d}\,x}{\sqrt{\frac{c}{dx^2}+1}}+2b^2cd\left(\begin{cases}\frac{\sqrt{c}\,x^2}{2} & \text{for}\ d=0\\ \frac{(c+dx^2)^{\frac{3}{2}}}{3d} & \text{otherwise}\end{cases}\right) + b^2d^2\left(\begin{cases}-\frac{2c^2\sqrt{c+dx^2}}{15d^2}+\frac{cx^2\sqrt{c+dx^2}}{15d}+\frac{x^4\sqrt{c+dx^2}}{5} & \text{for}\ d\neq 0\\ \frac{\sqrt{c}\,x^4}{4} & \text{otherwise}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.36 Problem number 635

$$\int \frac{(a+bx^2)^2 (c+dx^2)^{5/2}}{x^7}\,dx$$

Optimal antiderivative

$$\frac{5d(8b^2c^2+ad(ad+12bc))(d\,x^2+c)^{\frac{3}{2}}}{48c^2}-\frac{(8b^2c^2+ad(ad+12bc))(d\,x^2+c)^{\frac{5}{2}}}{16c^2x^2} -\frac{a^2(d\,x^2+c)^{\frac{7}{2}}}{6c\,x^6}-\frac{a(ad+12bc)(d\,x^2+c)^{\frac{7}{2}}}{24c^2x^4} -\frac{5d(8b^2c^2+ad(ad+12bc))\operatorname{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)}{16\sqrt{c}} +\frac{5d(8b^2c^2+ad(ad+12bc))\sqrt{d\,x^2+c}}{16c}$$

command

```
integrate((b*x**2+a)**2*(d*x**2+c)**(5/2)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2c^3}{6\sqrt{d}\,x^7\sqrt{\frac{c}{dx^2}+1}}-\frac{17a^2c^2\sqrt{d}}{24x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{35a^2cd^{\frac{3}{2}}}{48x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{a^2d^{\frac{5}{2}}\sqrt{\frac{c}{dx^2}+1}}{2x} -\frac{3a^2d^{\frac{5}{2}}}{16x\sqrt{\frac{c}{dx^2}+1}}-\frac{5a^2d^3\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{16\sqrt{c}}-\frac{15ab\sqrt{c}\,d^2\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{4} -\frac{abc^3}{2\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}-\frac{3abc^2\sqrt{d}}{4x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{2abcd^{\frac{3}{2}}\sqrt{\frac{c}{dx^2}+1}}{x}+\frac{7abcd^{\frac{3}{2}}}{4x\sqrt{\frac{c}{dx^2}+1}} +\frac{2abd^{\frac{5}{2}}x}{\sqrt{\frac{c}{dx^2}+1}}-\frac{5b^2c^{\frac{3}{2}}d\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{2}-\frac{b^2c^2\sqrt{d}\sqrt{\frac{c}{dx^2}+1}}{2x} +\frac{2b^2c^2\sqrt{d}}{x\sqrt{\frac{c}{dx^2}+1}}+\frac{2b^2cd^{\frac{3}{2}}x}{\sqrt{\frac{c}{dx^2}+1}}+b^2d^2\left(\begin{cases}\frac{\sqrt{c}\,x^2}{2} & \text{for } d=0\\ \frac{(c+dx^2)^{\frac{3}{2}}}{3d} & \text{otherwise}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.37 Problem number 645

$$\int \frac{(a+bx^2)^2}{x^5\sqrt{c+dx^2}}\,dx$$

Optimal antiderivative

$$-\frac{(3a^2d^2-8abcd+8b^2c^2)\,\mathrm{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)}{8c^{\frac{5}{2}}}-\frac{a^2\sqrt{d\,x^2+c}}{4c\,x^4}-\frac{a(-3ad+8bc)\sqrt{d\,x^2+c}}{8c^2x^2}$$

command

```
integrate((b*x**2+a)**2/x**5/(d*x**2+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2}{4\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}+\frac{a^2\sqrt{d}}{8cx^3\sqrt{\frac{c}{dx^2}+1}}+\frac{3a^2d^{\frac{3}{2}}}{8c^2x\sqrt{\frac{c}{dx^2}+1}}-\frac{3a^2d^2\,\mathrm{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{8c^{\frac{5}{2}}}-\frac{ab\sqrt{d}\sqrt{\frac{c}{dx^2}+1}}{cx}+\frac{abd\,\mathrm{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{c^{\frac{3}{2}}}-\frac{b^2\,\mathrm{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{\sqrt{c}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.38 Problem number 647

$$\int \frac{(a+bx^2)^2}{x^7\sqrt{c+dx^2}}\,dx$$

Optimal antiderivative

$$\frac{d(5a^2d^2-12abcd+8b^2c^2)\,\mathrm{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)}{16c^{\frac{7}{2}}}-\frac{a^2\sqrt{d\,x^2+c}}{6c\,x^6}-\frac{a(-5ad+12bc)\sqrt{d\,x^2+c}}{24c^2x^4}-\frac{(5a^2d^2-12abcd+8b^2c^2)\sqrt{d\,x^2+c}}{16c^3x^2}$$

command

```
integrate((b*x**2+a)**2/x**7/(d*x**2+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2}{6\sqrt{d}\,x^7\sqrt{\frac{c}{dx^2}+1}}+\frac{a^2\sqrt{d}}{24cx^5\sqrt{\frac{c}{dx^2}+1}}-\frac{5a^2d^{\frac{3}{2}}}{48c^2x^3\sqrt{\frac{c}{dx^2}+1}}-\frac{5a^2d^{\frac{5}{2}}}{16c^3x\sqrt{\frac{c}{dx^2}+1}}+\frac{5a^2d^3\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{16c^{\frac{7}{2}}}-\frac{ab}{2\sqrt{d}\,x^5\sqrt{\frac{c}{dx^2}+1}}+\frac{ab\sqrt{d}}{4cx^3\sqrt{\frac{c}{dx^2}+1}}+\frac{3abd^{\frac{3}{2}}}{4c^2x\sqrt{\frac{c}{dx^2}+1}}-\frac{3abd^2\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{4c^{\frac{5}{2}}}-\frac{b^2\sqrt{d}\sqrt{\frac{c}{dx^2}+1}}{2cx}+\frac{b^2d\operatorname{asinh}\left(\frac{\sqrt{c}}{\sqrt{d}\,x}\right)}{2c^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.39 Problem number 807

$$\int\frac{(ex)^{7/2}\,(A+Bx^2)}{(a+bx^2)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{(7Ab-9Ba)\,e(ex)^{\frac{5}{2}}}{7b^2\sqrt{b\,x^2+a}}+\frac{2B(ex)^{\frac{9}{2}}}{7be\sqrt{b\,x^2+a}}+\frac{5(7Ab-9Ba)\,e^3\sqrt{ex}\,\sqrt{b\,x^2+a}}{21b^3}-\frac{5a^{\frac{3}{4}}(7Ab-9Ba)\,e^{\frac{7}{2}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\;\operatorname{EllipticF}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\cdots\right.}{42\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)b^{\frac{13}{4}}\sqrt{b\,x^2+a}}$$

command

```
integrate((e*x)**(7/2)*(B*x**2+A)/(b*x**2+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{7}{2}}x^{\frac{9}{2}}\Gamma\left(\frac{9}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{3}{2},\frac{9}{4}\\ \frac{13}{4}\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{3}{2}}\Gamma\left(\frac{13}{4}\right)}+\frac{Be^{\frac{7}{2}}x^{\frac{13}{2}}\Gamma\left(\frac{13}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{3}{2},\frac{13}{4}\\ \frac{17}{4}\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{3}{2}}\Gamma\left(\frac{17}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.40 Problem number 808

$$\int \frac{(ex)^{5/2}\left(A+Bx^2\right)}{\left(a+bx^2\right)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{(5Ab-7Ba)\,e(ex)^{\frac{3}{2}}}{5b^2\sqrt{b\,x^2+a}}+\frac{2B(ex)^{\frac{7}{2}}}{5be\sqrt{b\,x^2+a}}+\frac{3(5Ab-7Ba)\,e^2\sqrt{ex}\,\sqrt{b\,x^2+a}}{5b^{\frac{5}{2}}\left(\sqrt{a}+x\sqrt{b}\right)}$$

$$-\frac{3a^{\frac{1}{4}}(5Ab-7Ba)\,e^{\frac{5}{2}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\;\operatorname{EllipticE}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\right.}{5\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)b^{\frac{11}{4}}\sqrt{b\,x^2+a}}$$

$$+\frac{3a^{\frac{1}{4}}(5Ab-7Ba)\,e^{\frac{5}{2}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\;\operatorname{EllipticF}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\right.}{10\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)b^{\frac{11}{4}}\sqrt{b\,x^2+a}}$$

command

```
integrate((e*x)**(5/2)*(B*x**2+A)/(b*x**2+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{5}{2}}x^{\frac{7}{2}}\Gamma\left(\frac{7}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{3}{2},\frac{7}{4}\\\frac{11}{4}\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{3}{2}}\Gamma\left(\frac{11}{4}\right)}+\frac{Be^{\frac{5}{2}}x^{\frac{11}{2}}\Gamma\left(\frac{11}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{3}{2},\frac{11}{4}\\\frac{15}{4}\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{3}{2}}\Gamma\left(\frac{15}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.41 Problem number 816

$$\int \frac{(ex)^{5/2}\left(A+Bx^2\right)}{\left(a+bx^2\right)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{(Ab-Ba)\,(ex)^{\frac{7}{2}}}{3abe\,(b\,x^2+a)^{\frac{3}{2}}}+\frac{(Ab-7Ba)\,e(ex)^{\frac{3}{2}}}{6a\,b^2\sqrt{b\,x^2+a}}-\frac{(Ab-7Ba)\,e^2\sqrt{ex}\,\sqrt{b\,x^2+a}}{2a\,b^{\frac{5}{2}}\left(\sqrt{a}+x\sqrt{b}\right)}$$
$$+\frac{(Ab-7Ba)\,e^{\frac{5}{2}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticE}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{b}\right)}{2\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)a^{\frac{3}{4}}b^{\frac{11}{4}}\sqrt{b\,x^2+a}}$$
$$-\frac{(Ab-7Ba)\,e^{\frac{5}{2}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{b}\right)}{4\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)a^{\frac{3}{4}}b^{\frac{11}{4}}\sqrt{b\,x^2+a}}$$

command

```
integrate((e*x)**(5/2)*(B*x**2+A)/(b*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{5}{2}}x^{\frac{7}{2}}\Gamma\left(\frac{7}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{7}{4},\frac{5}{2}\\ \frac{11}{4}\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{11}{4}\right)}+\frac{Be^{\frac{5}{2}}x^{\frac{11}{2}}\Gamma\left(\frac{11}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{5}{2},\frac{11}{4}\\ \frac{15}{4}\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{15}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.42 Problem number 817

$$\int \frac{(ex)^{3/2}\left(A+Bx^2\right)}{\left(a+bx^2\right)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{(Ab-Ba)\,(ex)^{\frac{5}{2}}}{3abe\left(b\,x^2+a\right)^{\frac{3}{2}}}-\frac{(Ab+5Ba)\,e\sqrt{ex}}{6a\,b^2\sqrt{b\,x^2+a}}+\frac{(Ab+5Ba)\,e^{\frac{3}{2}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\;\mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{b}\right)}{12\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)a^{\frac{5}{4}}b^{\frac{9}{4}}\sqrt{b\,x^2+a}}$$

command

```
integrate((e*x)**(3/2)*(B*x**2+A)/(b*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{3}{2}}x^{\frac{5}{2}}\Gamma\left(\frac{5}{4}\right){}_2F_1\left(\begin{matrix}\frac{5}{4},\frac{5}{2}\\ \frac{9}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{9}{4}\right)}+\frac{Be^{\frac{3}{2}}x^{\frac{9}{2}}\Gamma\left(\frac{9}{4}\right){}_2F_1\left(\begin{matrix}\frac{9}{4},\frac{5}{2}\\ \frac{13}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{13}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.43 Problem number 820

$$\int \frac{A+Bx^2}{(ex)^{3/2}\left(a+bx^2\right)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{(7Ab-Ba)(ex)^{\frac{3}{2}}}{3a^2e^3(b\,x^2+a)^{\frac{3}{2}}}-\frac{2A}{ae\,(b\,x^2+a)^{\frac{3}{2}}\sqrt{ex}}-\frac{(7Ab-Ba)(ex)^{\frac{3}{2}}}{2a^3e^3\sqrt{b\,x^2+a}}+\frac{(7Ab-Ba)\sqrt{ex}\,\sqrt{b\,x^2+a}}{2a^3e^2\sqrt{b}\left(\sqrt{a}+x\sqrt{b}\right)}$$

$$-\frac{(7Ab-Ba)\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticE}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{b}\right)\sqrt{}}{2\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)a^{\frac{11}{4}}b^{\frac{3}{4}}e^{\frac{3}{2}}\sqrt{b\,x^2+a}}$$

$$+\frac{(7Ab-Ba)\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{b}\right)\sqrt{}}{4\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)a^{\frac{11}{4}}b^{\frac{3}{4}}e^{\frac{3}{2}}\sqrt{b\,x^2+a}}$$

command

```
integrate((B*x**2+A)/(e*x)**(3/2)/(b*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{1}{4}\right){}_2F_1\left(\begin{matrix}-\frac{1}{4},\frac{5}{2}\\ \frac{3}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{3}{2}}\sqrt{x}\,\Gamma\left(\frac{3}{4}\right)}+\frac{Bx^{\frac{3}{2}}\Gamma\left(\frac{3}{4}\right){}_2F_1\left(\begin{matrix}\frac{3}{4},\frac{5}{2}\\ \frac{7}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{3}{2}}\Gamma\left(\frac{7}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.44 Problem number 821

$$\int\frac{A+Bx^2}{(ex)^{5/2}\left(a+bx^2\right)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A}{3ae\,(ex)^{\frac{3}{2}}(b\,x^2+a)^{\frac{3}{2}}}-\frac{(3Ab-Ba)\sqrt{ex}}{3a^2e^3(b\,x^2+a)^{\frac{3}{2}}}-\frac{5(3Ab-Ba)\sqrt{ex}}{6a^3e^3\sqrt{b\,x^2+a}}$$

$$-\frac{5(3Ab-Ba)\sqrt{\frac{\cos\left(4\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{b}\right)\sqrt{}}{12\cos\left(2\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{a^{\frac{1}{4}}\sqrt{e}}\right)\right)a^{\frac{13}{4}}b^{\frac{1}{4}}e^{\frac{5}{2}}\sqrt{b\,x^2+a}}$$

command

```
integrate((B*x**2+A)/(e*x)**(5/2)/(b*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{3}{4}\right){}_{2}F_{1}\left(\left.\begin{matrix}-\frac{3}{4},\frac{5}{2}\\\frac{1}{4}\end{matrix}\right|\frac{bx^{2}e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{5}{2}}x^{\frac{3}{2}}\Gamma\left(\frac{1}{4}\right)}+\frac{B\sqrt{x}\,\Gamma\left(\frac{1}{4}\right){}_{2}F_{1}\left(\left.\begin{matrix}\frac{1}{4},\frac{5}{2}\\\frac{5}{4}\end{matrix}\right|\frac{bx^{2}e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{5}{2}}\Gamma\left(\frac{5}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.45 Problem number 1010

$$\int \frac{x}{\sqrt[3]{1-x^{2}}\,(3+x^{2})}\,dx$$

Optimal antiderivative

$$-\frac{\ln\left(x^{2}+3\right)2^{\frac{1}{3}}}{8}+\frac{3\ln\left(2^{\frac{2}{3}}-\left(-x^{2}+1\right)^{\frac{1}{3}}\right)2^{\frac{1}{3}}}{8}+\frac{\arctan\left(\frac{\left(1+\left(-2x^{2}+2\right)^{\frac{1}{3}}\right)\sqrt{3}}{3}\right)\sqrt{3}\,2^{\frac{1}{3}}}{4}$$

command

```
integrate(x/(-x**2+1)**(1/3)/(x**2+3),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\sqrt[3]{2}\left(\frac{\log\left(\sqrt[3]{2-2x^{2}}-2\right)}{4}-\frac{\log\left(\left(2-2x^{2}\right)^{\frac{2}{3}}+2\sqrt[3]{2-2x^{2}}+4\right)}{8}+\frac{\sqrt{3}\operatorname{atan}\left(\frac{\sqrt{3}\left(\sqrt[3]{2-2x^{2}}+1\right)}{3}\right)}{4}\right) & \text{for}\ x>-1\wedge x<\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\int \frac{x}{\sqrt[3]{-(x-1)(x+1)}\,(x^{2}+3)}\,dx$$

12.46 Problem number 1119

$$\int \frac{c+dx^2}{(ex)^{7/2}\left(a+bx^2\right)^{7/4}}\,dx$$

Optimal antiderivative

$$-\frac{2c}{5ae\,(ex)^{\frac{5}{2}}\,(b\,x^2+a)^{\frac{3}{4}}}-\frac{2(-5ad+8bc)}{15a^2e^3\,(b\,x^2+a)^{\frac{3}{4}}\,\sqrt{ex}}+\frac{8(-5ad+8bc)\,\left(b\,x^2+a\right)^{\frac{1}{4}}}{15a^3e^3\sqrt{ex}}$$

command

```
integrate((d*x**2+c)/(e*x)**(7/2)/(b*x**2+a)**(7/4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$c\left(-\frac{3a^3b^{\frac{17}{4}}\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(-\frac{5}{4}\right)}{32a^5b^4e^{\frac{7}{2}}x^2\Gamma\left(\frac{7}{4}\right)+64a^4b^5e^{\frac{7}{2}}x^4\Gamma\left(\frac{7}{4}\right)+32a^3b^6e^{\frac{7}{2}}x^6\Gamma\left(\frac{7}{4}\right)}+\frac{21a^2b^{\frac{21}{4}}x^2\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(-\frac{5}{4}\right)}{32a^5b^4e^{\frac{7}{2}}x^2\Gamma\left(\frac{7}{4}\right)+64a^4b^5e^{\frac{7}{2}}x^4\Gamma\left(\frac{7}{4}\right)+32a^3b^6e^{\frac{7}{2}}x^6\Gamma\left(\frac{7}{4}\right)}+\frac{56ab^{\frac{25}{4}}x^4\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(-\frac{5}{4}\right)}{32a^5b^4e^{\frac{7}{2}}x^2\Gamma\left(\frac{7}{4}\right)+64a^4b^5e^{\frac{7}{2}}x^4\Gamma\left(\frac{7}{4}\right)+32a^3b^6e^{\frac{7}{2}}x^6\Gamma\left(\frac{7}{4}\right)}+\frac{32b^{\frac{29}{4}}x^6\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(-\frac{5}{4}\right)}{32a^5b^4e^{\frac{7}{2}}x^2\Gamma\left(\frac{7}{4}\right)+64a^4b^5e^{\frac{7}{2}}x^4\Gamma\left(\frac{7}{4}\right)+32a^3b^6e^{\frac{7}{2}}x^6\Gamma\left(\frac{7}{4}\right)}\right)+d\left(\frac{3\Gamma\left(-\frac{1}{4}\right)}{8ab^{\frac{3}{4}}e^{\frac{7}{2}}x^2\left(\frac{a}{bx^2}+1\right)^{\frac{3}{4}}\Gamma\left(\frac{7}{4}\right)}+\frac{\sqrt[4]{b}\,\Gamma\left(-\frac{1}{4}\right)}{2a^2e^{\frac{7}{2}}\left(\frac{a}{bx^2}+1\right)^{\frac{3}{4}}\Gamma\left(\frac{7}{4}\right)}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.47 Problem number 1121

$$\int \frac{(ex)^{7/2}\,(c+dx^2)}{(a+bx^2)^{7/4}}\,dx$$

Optimal antiderivative

$$\frac{2(-ad+bc)\,(ex)^{\frac{9}{2}}}{3abe\,(b\,x^2+a)^{\frac{3}{4}}}-\frac{(-3ad+2bc)\,e(ex)^{\frac{5}{2}}\,(b\,x^2+a)^{\frac{1}{4}}}{3a\,b^2}$$
$$+\frac{5(-3ad+2bc)\,e^2\left(1+\frac{a}{b\,x^2}\right)^{\frac{3}{4}}(ex)^{\frac{3}{2}}\,\sqrt{2}\,\sqrt{\frac{x\sqrt{b}\,+\sqrt{a}\,\sqrt{\frac{b\,x^2+a}{a}}}{\sqrt{a}\,\sqrt{\frac{b\,x^2+a}{a}}}}\ \mathrm{EllipticF}\left(\sin\left(\frac{\operatorname{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right),\sqrt{2}\right)\sqrt{a}}{12\cos\left(\frac{\operatorname{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right)b^{\frac{5}{2}}\,(b\,x^2+a)^{\frac{3}{4}}}$$
$$+\frac{5(-3ad+2bc)\,e^3(b\,x^2+a)^{\frac{1}{4}}\,\sqrt{ex}}{6b^3}$$

command

```
integrate((e*x)**(7/2)*(d*x**2+c)/(b*x**2+a)**(7/4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{ce^{\frac{7}{2}}x^{\frac{9}{2}}\Gamma\left(\frac{9}{4}\right)\,{}_2F_1\left(\begin{matrix}\frac{7}{4},\frac{9}{4}\\\frac{13}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{7}{4}}\Gamma\left(\frac{13}{4}\right)}+\frac{de^{\frac{7}{2}}x^{\frac{13}{2}}\Gamma\left(\frac{13}{4}\right)\,{}_2F_1\left(\begin{matrix}\frac{7}{4},\frac{13}{4}\\\frac{17}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{7}{4}}\Gamma\left(\frac{17}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.48 Problem number 1127

$$\int \frac{(ex)^{3/2}\,(c+dx^2)}{(a+bx^2)^{9/4}}\,dx$$

Optimal antiderivative

$$\frac{2(-ad+bc)\,(ex)^{\frac{5}{2}}}{5abe\,(b\,x^2+a)^{\frac{5}{4}}}+\frac{d\,e^{\frac{3}{2}}\arctan\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{(b\,x^2+a)^{\frac{1}{4}}\sqrt{e}}\right)}{b^{\frac{9}{4}}}+\frac{d\,e^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{b^{\frac{1}{4}}\sqrt{ex}}{(b\,x^2+a)^{\frac{1}{4}}\sqrt{e}}\right)}{b^{\frac{9}{4}}}-\frac{2de\sqrt{ex}}{b^2\,(b\,x^2+a)^{\frac{1}{4}}}$$

command

```
integrate((e*x)**(3/2)*(d*x**2+c)/(b*x**2+a)**(9/4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{ce^{\frac{3}{2}}x^{\frac{5}{2}}\Gamma\left(\frac{5}{4}\right)}{2a^{\frac{9}{4}}\sqrt[4]{1+\frac{bx^2}{a}}\,\Gamma\left(\frac{9}{4}\right)+2a^{\frac{5}{4}}bx^2\sqrt[4]{1+\frac{bx^2}{a}}\,\Gamma\left(\frac{9}{4}\right)}+\frac{de^{\frac{3}{2}}x^{\frac{9}{2}}\Gamma\left(\frac{9}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{9}{4},\frac{9}{4}\\\frac{13}{4}\end{matrix}\right|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{9}{4}}\Gamma\left(\frac{13}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.49 Problem number 1129

$$\int \frac{c+dx^2}{(ex)^{5/2}\left(a+bx^2\right)^{9/4}}\,dx$$

Optimal antiderivative

$$-\frac{2c}{3ae\left(ex\right)^{\frac{3}{2}}\left(b\,x^2+a\right)^{\frac{5}{4}}}-\frac{2(-3ad+8bc)\sqrt{ex}}{15a^2e^3\left(b\,x^2+a\right)^{\frac{5}{4}}}-\frac{8(-3ad+8bc)\sqrt{ex}}{15a^3e^3\left(b\,x^2+a\right)^{\frac{1}{4}}}$$

command

```
integrate((d*x**2+c)/(e*x)**(5/2)/(b*x**2+a)**(9/4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$c\left(\frac{5a^2b^{\frac{19}{4}}\left(\frac{a}{bx^2}+1\right)^{\frac{3}{4}}\Gamma\left(-\frac{3}{4}\right)}{32a^5b^4e^{\frac{5}{2}}\Gamma\left(\frac{9}{4}\right)+64a^4b^5e^{\frac{5}{2}}x^2\Gamma\left(\frac{9}{4}\right)+32a^3b^6e^{\frac{5}{2}}x^4\Gamma\left(\frac{9}{4}\right)}+\frac{40ab^{\frac{23}{4}}x^2\left(\frac{a}{bx^2}+1\right)^{\frac{3}{4}}\Gamma\left(-\frac{3}{4}\right)}{32a^5b^4e^{\frac{5}{2}}\Gamma\left(\frac{9}{4}\right)+64a^4b^5e^{\frac{5}{2}}x^2\Gamma\left(\frac{9}{4}\right)+32a^3b^6e^{\frac{5}{2}}x^4\Gamma\left(\frac{9}{4}\right)}+\frac{32b^{\frac{27}{4}}x^4\left(\frac{a}{bx^2}+1\right)^{\frac{3}{4}}\Gamma\left(-\frac{3}{4}\right)}{32a^5b^4e^{\frac{5}{2}}\Gamma\left(\frac{9}{4}\right)+64a^4b^5e^{\frac{5}{2}}x^2\Gamma\left(\frac{9}{4}\right)+32a^3b^6e^{\frac{5}{2}}x^4\Gamma\left(\frac{9}{4}\right)}\right)+d\left(\frac{5a\Gamma\left(\frac{1}{4}\right)}{8a^3\sqrt[4]{b}\,e^{\frac{5}{2}}\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(\frac{9}{4}\right)+8a^2b^{\frac{5}{4}}e^{\frac{5}{2}}x^2\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(\frac{9}{4}\right)}+\frac{4bx^2\Gamma\left(\frac{1}{4}\right)}{8a^3\sqrt[4]{b}\,e^{\frac{5}{2}}\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(\frac{9}{4}\right)+8a^2b^{\frac{5}{4}}e^{\frac{5}{2}}x^2\sqrt[4]{\frac{a}{bx^2}+1}\,\Gamma\left(\frac{9}{4}\right)}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.50 Problem number 1134

$$\int \frac{(ex)^{5/2}\left(c+dx^2\right)}{\left(a+bx^2\right)^{9/4}}\,dx$$

Optimal antiderivative

$$\frac{2(-ad+bc)\,(ex)^{\frac{7}{2}}}{5abe\,(b\,x^2+a)^{\frac{5}{4}}}-\frac{(-7ad+2bc)\,e(ex)^{\frac{3}{2}}}{5a\,b^2\,(b\,x^2+a)^{\frac{1}{4}}}$$
$$-\frac{3(-7ad+2bc)\,e^2\left(1+\frac{a}{b\,x^2}\right)^{\frac{1}{4}}\sqrt{2}\,\sqrt{\frac{x\sqrt{b}+\sqrt{a}\,\sqrt{\frac{b\,x^2+a}{a}}}{\sqrt{a}\,\sqrt{\frac{b\,x^2+a}{a}}}}\;\mathrm{EllipticE}\left(\sin\left(\frac{\mathrm{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right),\sqrt{2}\right)\sqrt{ex}}{10\cos\left(\frac{\mathrm{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right)b^{\frac{5}{2}}\,(b\,x^2+a)^{\frac{1}{4}}\,\sqrt{a}}$$

command

```
integrate((e*x)**(5/2)*(d*x**2+c)/(b*x**2+a)**(9/4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{ce^{\frac{5}{2}}x^{\frac{7}{2}}\Gamma\left(\frac{7}{4}\right){}_2F_1\left(\begin{matrix}\frac{7}{4},\frac{9}{4}\\\frac{11}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{9}{4}}\Gamma\left(\frac{11}{4}\right)}+\frac{de^{\frac{5}{2}}x^{\frac{11}{2}}\Gamma\left(\frac{11}{4}\right){}_2F_1\left(\begin{matrix}\frac{9}{4},\frac{11}{4}\\\frac{15}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{9}{4}}\Gamma\left(\frac{15}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

12.51 Problem number 1136

$$\int \frac{c+dx^2}{(ex)^{3/2}\,(a+bx^2)^{9/4}}\,dx$$

Optimal antiderivative

$$-\frac{2(-ad+6bc)\,(ex)^{\frac{3}{2}}}{5a^2e^3\,(b\,x^2+a)^{\frac{5}{4}}}-\frac{2c}{ae\,(b\,x^2+a)^{\frac{5}{4}}\,\sqrt{ex}}+\frac{2(-ad+6bc)\,\left(1+\frac{a}{b\,x^2}\right)^{\frac{1}{4}}\sqrt{2}\,\sqrt{\frac{x\sqrt{b}+\sqrt{a}\,\sqrt{\frac{b\,x^2+a}{a}}}{\sqrt{a}\,\sqrt{\frac{b\,x^2+a}{a}}}}\;\mathrm{EllipticE}\left(\sin\left(\frac{\mathrm{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right),\sqrt{2}\right)\sqrt{ex}}{5\cos\left(\frac{\mathrm{arccot}\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{2}\right)a^{\frac{5}{2}}e^2\,(b\,x^2+a)^{\frac{1}{4}}\,\sqrt{b}}$$

command

```
integrate((d*x**2+c)/(e*x)**(3/2)/(b*x**2+a)**(9/4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{c\Gamma\left(-\frac{1}{4}\right)\,{}_2F_1\left(\begin{matrix}-\frac{1}{4},\frac{9}{4}\\ \frac{3}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{9}{4}}e^{\frac{3}{2}}\sqrt{x}\,\Gamma\left(\frac{3}{4}\right)}+\frac{dx^{\frac{3}{2}}\Gamma\left(\frac{3}{4}\right)\,{}_2F_1\left(\begin{matrix}\frac{3}{4},\frac{9}{4}\\ \frac{7}{4}\end{matrix}\middle|\frac{bx^2e^{i\pi}}{a}\right)}{2a^{\frac{9}{4}}e^{\frac{3}{2}}\Gamma\left(\frac{7}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

13 Test file number 23

Test folder name:

```
test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.2_Quadratic/23_1.1.2.6-
g_x-^m-a+b_x^2-^p-c+d_x^2-^q-e+f_x^2-^r
```

13.1 Problem number 7

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)}{(a+bx^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{(Ab(ad(1-m)-bc(3-m))-aB(bc(1+m)-ad(3+m)))(ex)^{1+m}}{8a^2b^2e(b\,x^2+a)}$$
$$+\frac{(Ab-Ba)(ex)^{1+m}(d\,x^2+c)}{4abe(b\,x^2+a)^2}$$
$$+\frac{(Ab(1-m)(bc(3-m)+ad(1+m))+aB(1+m)(ad(3+m)+b(-cm+c)))(ex)^{1+m}\operatorname{hypergeom}\left(\left[1,\frac{1}{2}+\frac{m}{2}\right],\right.}{8a^3b^2e(1+m)}$$

command

```
integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)/(b*x**2+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

13.2 Problem number 15

$$\int (ex)^m (a+bx^2)^3 (A+Bx^2)(c+dx^2)^3\,dx$$

Optimal antiderivative

$$\frac{a^3A\,c^3(ex)^{1+m}}{e(1+m)}+\frac{a^2c^2(aBc+3A(ad+bc))(ex)^{3+m}}{e^3(3+m)}$$
$$+\frac{3ac\left(aBc(ad+bc)+A\left(a^2d^2+3abcd+b^2c^2\right)\right)(ex)^{5+m}}{e^5(5+m)}$$
$$+\frac{\left(3aBc\left(a^2d^2+3abcd+b^2c^2\right)+A\left(a^3d^3+9a^2bc\,d^2+9a\,b^2c^2d+b^3c^3\right)\right)(ex)^{7+m}}{e^7(7+m)}$$
$$+\frac{\left(a^3B\,d^3+9a\,b^2cd(Ad+Bc)+3a^2b\,d^2(Ad+3Bc)+b^3c^2(3Ad+Bc)\right)(ex)^{9+m}}{e^9(9+m)}$$
$$+\frac{3bd\left(a^2B\,d^2+b^2c(Ad+Bc)+abd(Ad+3Bc)\right)(ex)^{11+m}}{e^{11}(11+m)}$$
$$+\frac{b^2d^2(Abd+3aBd+3bBc)(ex)^{13+m}}{e^{13}(13+m)}+\frac{b^3B\,d^3(ex)^{15+m}}{e^{15}(15+m)}$$

command

```
integrate((e*x)**m*(b*x**2+a)**3*(B*x**2+A)*(d*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

13.3 Problem number 39

$$\int \frac{(ex)^m \left(a+bx^2\right)\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx$$

Optimal antiderivative

$$-\frac{(-ad+bc)\,(ex)^{1+m}\left(B\,x^2+A\right)}{4cde\left(d\,x^2+c\right)^2}+\frac{(bc(Ad(1+m)-Bc(3+m))+ad(Ad(3-m)-B(-cm+c)))\,(ex)^{1+m}}{8c^2d^2e\left(d\,x^2+c\right)}+\frac{(ad(1-m)\,(Ad(3-m)+Bc(1+m))+bc(1+m)\,(Ad(1-m)+Bc(3+m)))\,(ex)^{1+m}\,\mathrm{hypergeom}\left(\left[1,\frac{1}{2}+\frac{m}{2}\right],\right.}{8c^3d^2e\,(1+m)}$$

command

```
integrate((e*x)**m*(b*x**2+a)*(B*x**2+A)/(d*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

13.4 Problem number 46

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right)\left(c+dx^2\right)dx$$

Optimal antiderivative

$$-\frac{(aBd(3+m)-b(2Ad+Bc(5+m+2p)))\,(ex)^{1+m}\left(b\,x^2+a\right)^{1+p}}{b^2e\,(3+m+2p)\,(5+m+2p)}+\frac{d(ex)^{1+m}\left(b\,x^2+a\right)^{1+p}\left(B\,x^2+A\right)}{be\,(5+m+2p)}-\frac{(Ab(3+m+2p)\,(ad(1+m)-bc(5+m+2p))-a(1+m)\,(aBd(3+m)-b(2Ad+Bc(5+m+2p))))\,(ex)^{1+m}}{b^2e\,(1+m)\,(3+m+2p)\,(5+m+2p)}$$

command

```
integrate((e*x)**m*(b*x**2+a)**p*(B*x**2+A)*(d*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Aa^p ce^m xx^m \Gamma\left(\frac{m}{2}+\frac{1}{2}\right) {}_2F_1\left(\begin{matrix} -p, \frac{m}{2}+\frac{1}{2} \\ \frac{m}{2}+\frac{3}{2} \end{matrix}\middle| \frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)} + \frac{Aa^p de^m x^3 x^m \Gamma\left(\frac{m}{2}+\frac{3}{2}\right) {}_2F_1\left(\begin{matrix} -p, \frac{m}{2}+\frac{3}{2} \\ \frac{m}{2}+\frac{5}{2} \end{matrix}\middle| \frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} + \frac{Ba^p ce^m x^3 x^m \Gamma\left(\frac{m}{2}+\frac{3}{2}\right) {}_2F_1\left(\begin{matrix} -p, \frac{m}{2}+\frac{3}{2} \\ \frac{m}{2}+\frac{5}{2} \end{matrix}\middle| \frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} + \frac{Ba^p de^m x^5 x^m \Gamma\left(\frac{m}{2}+\frac{5}{2}\right) {}_2F_1\left(\begin{matrix} -p, \frac{m}{2}+\frac{5}{2} \\ \frac{m}{2}+\frac{7}{2} \end{matrix}\middle| \frac{bx^2e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

14 Test file number 24

Test folder name:

test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.2_Quadratic/24_1.1.2.8_P-x-c_x-^m-a+b_x^2-^p

14.1 Problem number 47

$$\int \frac{x^7 (A+Bx+Cx^2)}{(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$-\frac{x^7(Ba-(Ab-aC)\,x)}{7ab\,(b\,x^2+a)^{\frac{7}{2}}} - \frac{x^5(7Ba-(Ab-8aC)\,x)}{35a\,b^2\,(b\,x^2+a)^{\frac{5}{2}}} - \frac{x^3(35Ba-6(Ab-8aC)\,x)}{105a\,b^3\,(b\,x^2+a)^{\frac{3}{2}}} + \frac{B\,\mathrm{arctanh}\left(\frac{x\sqrt{b}}{\sqrt{b\,x^2+a}}\right)}{b^{\frac{9}{2}}} - \frac{x(35Ba-8(Ab-8aC)\,x)}{35a\,b^4\sqrt{b\,x^2+a}} - \frac{16(Ab-8aC)\,\sqrt{b\,x^2+a}}{35a\,b^5}$$

command

```
integrate(x**7*(C*x**2+B*x+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.2 Problem number 48

$$\int \frac{x^6 (A + Bx + Cx^2)}{(a + bx^2)^{9/2}} \, dx$$

Optimal antiderivative

$$-\frac{x^6(Ba - (Ab - aC)\,x)}{7ab\,(b\,x^2 + a)^{\frac{7}{2}}} - \frac{x^4(7Cx + 6B)}{35b^2\,(b\,x^2 + a)^{\frac{5}{2}}} - \frac{x^2(35Cx + 24B)}{105b^3\,(b\,x^2 + a)^{\frac{3}{2}}} + \frac{C\,\mathrm{arctanh}\left(\frac{x\sqrt{b}}{\sqrt{b\,x^2 + a}}\right)}{b^{\frac{9}{2}}} + \frac{-35Cx - 16B}{35b^4\sqrt{b\,x^2 + a}}$$

command

```
integrate(x**6*(C*x**2+B*x+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.3 Problem number 49

$$\int \frac{x^5 (A + Bx + Cx^2)}{(a + bx^2)^{9/2}} \, dx$$

Optimal antiderivative

$$-\frac{x^5(Ba - (Ab - aC)\,x)}{7ab\,(b\,x^2 + a)^{\frac{7}{2}}} - \frac{x^4(-5bBx + Ab + 6aC)}{35a\,b^2\,(b\,x^2 + a)^{\frac{5}{2}}} + \frac{\frac{4Ab}{105} + \frac{8aC}{35}}{b^4\,(b\,x^2 + a)^{\frac{3}{2}}} - \frac{4(Ab + 6aC)}{35a\,b^4\sqrt{b\,x^2 + a}}$$

command

```
integrate(x**5*(C*x**2+B*x+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(\left(\begin{cases} -\frac{8a^2}{105a^3b^3\sqrt{a+bx^2}+315a^2b^4x^2\sqrt{a+bx^2}+315ab^5x^4\sqrt{a+bx^2}+105b^6x^6\sqrt{a+bx^2}} - \frac{}{105a^3b^3\sqrt{a+bx^2}+315a^2b^4x^2\sqrt{a} \cdots} \\ \frac{x^6}{6a^{\frac{9}{2}}} \end{cases}\right.\right.$$

$$+\frac{Bx^7}{7a^{\frac{9}{2}}\sqrt{1+\frac{bx^2}{a}}+21a^{\frac{7}{2}}bx^2\sqrt{1+\frac{bx^2}{a}}+21a^{\frac{5}{2}}b^2x^4\sqrt{1+\frac{bx^2}{a}}+7a^{\frac{3}{2}}b^3x^6\sqrt{1+\frac{bx^2}{a}}}$$

$$+C\left(\left(\begin{cases} -\frac{16a^3}{35a^3b^4\sqrt{a+bx^2}+105a^2b^5x^2\sqrt{a+bx^2}+105ab^6x^4\sqrt{a+bx^2}+35b^7x^6\sqrt{a+bx^2}} - \frac{}{35a^3b^4\sqrt{a+bx^2}+105a^2b^5x^2\sqrt{a-} \cdots} \\ \frac{x^8}{8a^{\frac{9}{2}}} \end{cases}\right.\right.$$

Sympy 1.8 under Python 3.8.8 output

Timed out

14.4 Problem number 50

$$\int \frac{x^4(A+Bx+Cx^2)}{(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$-\frac{x^4(Ba-(Ab-aC)\,x)}{7ab\,(b\,x^2+a)^{\frac{7}{2}}}-\frac{x^2(4Ba+(2Ab+5aC)\,x)}{35a\,b^2\,(b\,x^2+a)^{\frac{5}{2}}}+\frac{-8Ba-3(2Ab+5aC)\,x}{105a\,b^3\,(b\,x^2+a)^{\frac{3}{2}}}+\frac{(2Ab+5aC)\,x}{35a^2b^3\sqrt{b\,x^2+a}}$$

command

```
integrate(x**4*(C*x**2+B*x+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(\frac{7ax^5}{35a^{\frac{11}{2}}\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{9}{2}}bx^2\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{7}{2}}b^2x^4\sqrt{1+\frac{bx^2}{a}}+35a^{\frac{5}{2}}b^3x^6\sqrt{1+\frac{bx^2}{a}}}\right.$$
$$\left.+\frac{2bx^7}{35a^{\frac{11}{2}}\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{9}{2}}bx^2\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{7}{2}}b^2x^4\sqrt{1+\frac{bx^2}{a}}+35a^{\frac{5}{2}}b^3x^6\sqrt{1+\frac{bx^2}{a}}}\right)$$
$$+B\left(\begin{cases}-\frac{8a^2}{105a^3b^3\sqrt{a+bx^2}+315a^2b^4x^2\sqrt{a+bx^2}+315ab^5x^4\sqrt{a+bx^2}+105b^6x^6\sqrt{a+bx^2}}-\frac{}{105a^3b^3\sqrt{a+bx^2}+315a^2b^4x^2\sqrt{}} \\ \frac{x^6}{6a^{\frac{9}{2}}}\end{cases}\right.$$
$$+\frac{Cx^7}{7a^{\frac{9}{2}}\sqrt{1+\frac{bx^2}{a}}+21a^{\frac{7}{2}}bx^2\sqrt{1+\frac{bx^2}{a}}+21a^{\frac{5}{2}}b^2x^4\sqrt{1+\frac{bx^2}{a}}+7a^{\frac{3}{2}}b^3x^6\sqrt{1+\frac{bx^2}{a}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

14.5 Problem number 51

$$\int\frac{x^3(A+Bx+Cx^2)}{(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$-\frac{x^3(Ba-(Ab-aC)\,x)}{7ab\,(b\,x^2+a)^{\frac{7}{2}}}-\frac{x(3Ba+(3Ab+4aC)\,x)}{35a\,b^2\,(b\,x^2+a)^{\frac{5}{2}}}+\frac{3bBx-6Ab-8aC}{105a\,b^3\,(b\,x^2+a)^{\frac{3}{2}}}+\frac{2Bx}{35a^2b^2\sqrt{b\,x^2+a}}$$

command

```
integrate(x**3*(C*x**2+B*x+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(\left\{\begin{array}{l} -\frac{2a}{35a^3b^2\sqrt{a+bx^2}+105a^2b^3x^2\sqrt{a+bx^2}+105ab^4x^4\sqrt{a+bx^2}+35b^5x^6\sqrt{a+bx^2}} - \frac{}{35a^3b^2\sqrt{a+bx^2}+105a^2b^3x^2\sqrt{a+} } \\ \frac{x^4}{4a^{\frac{9}{2}}} \end{array}\right.\right.$$

$$+B\left(\frac{7ax^5}{35a^{\frac{11}{2}}\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{9}{2}}bx^2\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{7}{2}}b^2x^4\sqrt{1+\frac{bx^2}{a}}+35a^{\frac{5}{2}}b^3x^6\sqrt{1+\frac{bx^2}{a}}}\right.$$

$$\left.+\frac{2bx^7}{35a^{\frac{11}{2}}\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{9}{2}}bx^2\sqrt{1+\frac{bx^2}{a}}+105a^{\frac{7}{2}}b^2x^4\sqrt{1+\frac{bx^2}{a}}+35a^{\frac{5}{2}}b^3x^6\sqrt{1+\frac{bx^2}{a}}}\right)$$

$$+C\left(\left\{\begin{array}{l} -\frac{8a^2}{105a^3b^3\sqrt{a+bx^2}+315a^2b^4x^2\sqrt{a+bx^2}+315ab^5x^4\sqrt{a+bx^2}+105b^6x^6\sqrt{a+bx^2}} - \frac{}{105a^3b^3\sqrt{a+bx^2}+315a^2b^4x^2\sqrt{}} \\ \frac{x^6}{6a^{\frac{9}{2}}} \end{array}\right.\right.$$

Sympy 1.8 under Python 3.8.8 output

Timed out

14.6 Problem number 57

$$\int \frac{A+Bx+Cx^2}{x^3\left(a+bx^2\right)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{-a\left(\frac{Ab}{a}-C\right)-bBx}{7a^2\left(b\,x^2+a\right)^{\frac{7}{2}}}+\frac{-13bBx-14Ab+7aC}{35a^3\left(b\,x^2+a\right)^{\frac{5}{2}}}+\frac{-87bBx-105Ab+35aC}{105a^4\left(b\,x^2+a\right)^{\frac{3}{2}}}+\frac{(9Ab-2aC)\operatorname{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{2a^{\frac{11}{2}}}+\frac{-93bBx-140Ab+35aC}{35a^5\sqrt{b\,x^2+a}}-\frac{A\sqrt{b\,x^2+a}}{2a^5x^2}-\frac{B\sqrt{b\,x^2+a}}{a^5x}$$

command

```
integrate((C*x**2+B*x+A)/x**3/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.7 Problem number 148

$$\int \frac{c+dx^2+ex^4+fx^6}{x^5\sqrt{a+bx^2}}\,dx$$

Optimal antiderivative

$$-\frac{(8a^2e-4abd+3b^2c)\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{8a^{\frac{5}{2}}}+\frac{f\sqrt{b\,x^2+a}}{b}-\frac{c\sqrt{b\,x^2+a}}{4a\,x^4}+\frac{(-4ad+3bc)\sqrt{b\,x^2+a}}{8a^2x^2}$$

command

```
integrate((f*x**6+e*x**4+d*x**2+c)/x**5/(b*x**2+a)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$f\left(\begin{cases}\frac{x^2}{2\sqrt{a}} & \text{for } b=0\\ \frac{\sqrt{a+bx^2}}{b} & \text{otherwise}\end{cases}\right)-\frac{c}{4\sqrt{b}\,x^5\sqrt{\frac{a}{bx^2}+1}}+\frac{\sqrt{b}\,c}{8ax^3\sqrt{\frac{a}{bx^2}+1}}-\frac{\sqrt{b}\,d\sqrt{\frac{a}{bx^2}+1}}{2ax}+\frac{3b^{\frac{3}{2}}c}{8a^2x\sqrt{\frac{a}{bx^2}+1}}-\frac{e\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{\sqrt{a}}+\frac{bd\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{2a^{\frac{3}{2}}}-\frac{3b^2c\,\mathrm{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{8a^{\frac{5}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

14.8 Problem number 149

$$\int \frac{c+dx^2+ex^4+fx^6}{x^7\sqrt{a+bx^2}}\,dx$$

Optimal antiderivative

$$\frac{(-16a^3f+8a^2be-6a\,b^2d+5b^3c)\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{16a^{\frac{7}{2}}}-\frac{c\sqrt{b\,x^2+a}}{6a\,x^6}+\frac{(-6ad+5bc)\sqrt{b\,x^2+a}}{24a^2x^4}-\frac{(8a^2e-6abd+5b^2c)\sqrt{b\,x^2+a}}{16a^3x^2}$$

command

`integrate((f*x**6+e*x**4+d*x**2+c)/x**7/(b*x**2+a)**(1/2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{c}{6\sqrt{b}\,x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{d}{4\sqrt{b}\,x^5\sqrt{\frac{a}{bx^2}+1}}+\frac{\sqrt{b}\,c}{24ax^5\sqrt{\frac{a}{bx^2}+1}}+\frac{\sqrt{b}\,d}{8ax^3\sqrt{\frac{a}{bx^2}+1}}-\frac{\sqrt{b}\,e\sqrt{\frac{a}{bx^2}+1}}{2ax}-\frac{5b^{\frac{3}{2}}c}{48a^2x^3\sqrt{\frac{a}{bx^2}+1}}+\frac{3b^{\frac{3}{2}}d}{8a^2x\sqrt{\frac{a}{bx^2}+1}}-\frac{5b^{\frac{5}{2}}c}{16a^3x\sqrt{\frac{a}{bx^2}+1}}-\frac{f\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{\sqrt{a}}+\frac{be\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{2a^{\frac{3}{2}}}-\frac{3b^2d\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{8a^{\frac{5}{2}}}+\frac{5b^3c\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{16a^{\frac{7}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

14.9 Problem number 150

$$\int\frac{c+dx^2+ex^4+fx^6}{x^9\sqrt{a+bx^2}}\,dx$$

Optimal antiderivative

$$-\frac{b(-64a^3f+48a^2be-40a\,b^2d+35b^3c)\operatorname{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)}{128a^{\frac{9}{2}}}-\frac{c\sqrt{b\,x^2+a}}{8a\,x^8}+\frac{(-8ad+7bc)\sqrt{b\,x^2+a}}{48a^2x^6}-\frac{(48a^2e-40abd+35b^2c)\sqrt{b\,x^2+a}}{192a^3x^4}+\frac{(-64a^3f+48a^2be-40a\,b^2d+35b^3c)\sqrt{b\,x^2+a}}{128a^4x^2}$$

command

`integrate((f*x**6+e*x**4+d*x**2+c)/x**9/(b*x**2+a)**(1/2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{c}{8\sqrt{b}\,x^9\sqrt{\frac{a}{bx^2}+1}}-\frac{d}{6\sqrt{b}\,x^7\sqrt{\frac{a}{bx^2}+1}}-\frac{e}{4\sqrt{b}\,x^5\sqrt{\frac{a}{bx^2}+1}}$$
$$+\frac{\sqrt{b}\,c}{48ax^7\sqrt{\frac{a}{bx^2}+1}}+\frac{\sqrt{b}\,d}{24ax^5\sqrt{\frac{a}{bx^2}+1}}+\frac{\sqrt{b}\,e}{8ax^3\sqrt{\frac{a}{bx^2}+1}}-\frac{\sqrt{b}\,f\sqrt{\frac{a}{bx^2}+1}}{2ax}$$
$$-\frac{7b^{\frac{3}{2}}c}{192a^2x^5\sqrt{\frac{a}{bx^2}+1}}-\frac{5b^{\frac{3}{2}}d}{48a^2x^3\sqrt{\frac{a}{bx^2}+1}}+\frac{3b^{\frac{3}{2}}e}{8a^2x\sqrt{\frac{a}{bx^2}+1}}$$
$$+\frac{35b^{\frac{5}{2}}c}{384a^3x^3\sqrt{\frac{a}{bx^2}+1}}-\frac{5b^{\frac{5}{2}}d}{16a^3x\sqrt{\frac{a}{bx^2}+1}}+\frac{35b^{\frac{7}{2}}c}{128a^4x\sqrt{\frac{a}{bx^2}+1}}+\frac{bf\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{2a^{\frac{3}{2}}}$$
$$-\frac{3b^2e\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{8a^{\frac{5}{2}}}+\frac{5b^3d\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{16a^{\frac{7}{2}}}-\frac{35b^4c\operatorname{asinh}\left(\frac{\sqrt{a}}{\sqrt{b}\,x}\right)}{128a^{\frac{9}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

14.10 Problem number 160

$$\int \frac{x^6(A+Bx^2+Cx^4+Dx^6)}{(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{\left(A-\frac{a(b^2B-abC+a^2D)}{b^3}\right)x^7}{7a\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{(b^2B-2abC+3a^2D)\,x^7}{5a\,b^3\,(b\,x^2+a)^{\frac{5}{2}}}+\frac{(8b^2B-36abC+99a^2D)\,x^5}{60a\,b^4\,(b\,x^2+a)^{\frac{3}{2}}}$$
$$+\frac{Dx^7}{4b^3\,(b\,x^2+a)^{\frac{3}{2}}}+\frac{(8b^2B-36abC+99a^2D)\operatorname{arctanh}\left(\frac{x\sqrt{b}}{\sqrt{b\,x^2+a}}\right)}{8b^{\frac{13}{2}}}$$
$$+\frac{(8b^2B-36abC+99a^2D)\,x^3}{12a\,b^5\sqrt{b\,x^2+a}}-\frac{(8b^2B-36abC+99a^2D)\,x\sqrt{b\,x^2+a}}{8a\,b^6}$$

command

```
integrate(x**6*(D*x**6+C*x**4+B*x**2+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.11 Problem number 161

$$\int \frac{x^4 (A + Bx^2 + Cx^4 + Dx^6)}{(a + bx^2)^{9/2}} \, dx$$

Optimal antiderivative

$$\frac{\left(A - \frac{a(b^2B - abC + a^2D)}{b^3}\right) x^5}{7a\,(b\,x^2 + a)^{\frac{7}{2}}} + \frac{\left(2A\,b^3 + a\left(5b^2B - 12abC + 19a^2D\right)\right) x^5}{35a^2b^3\,(b\,x^2 + a)^{\frac{5}{2}}} + \frac{a(bC - 3aD)\,x}{3b^5\,(b\,x^2 + a)^{\frac{3}{2}}} + \frac{(2bC - 9aD)\operatorname{arctanh}\left(\frac{x\sqrt{b}}{\sqrt{b\,x^2 + a}}\right)}{2b^{\frac{11}{2}}} - \frac{(4bC - 15aD)\,x}{3b^5\sqrt{b\,x^2 + a}} + \frac{Dx\sqrt{b\,x^2 + a}}{2b^5}$$

command

```
integrate(x**4*(D*x**6+C*x**4+B*x**2+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.12 Problem number 162

$$\int \frac{x^2 (A + Bx^2 + Cx^4 + Dx^6)}{(a + bx^2)^{9/2}} \, dx$$

Optimal antiderivative

$$-\frac{a^3Dx}{b^4\,(b\,x^2 + a)^{\frac{7}{2}}} + \frac{\left(A\,b^3 - 10a^3D\right) x^3}{3a\,b^3\,(b\,x^2 + a)^{\frac{7}{2}}} + \frac{\left(4A\,b^3 + 3Ba\,b^2 - 58a^3D\right) x^5}{15a^2b^2\,(b\,x^2 + a)^{\frac{7}{2}}} + \frac{\left(8A\,b^3 + 6Ba\,b^2 + 15C\,a^2b - 176a^3D\right) x^7}{105a^3b\,(b\,x^2 + a)^{\frac{7}{2}}} + \frac{D\operatorname{arctanh}\left(\frac{x\sqrt{b}}{\sqrt{b\,x^2 + a}}\right)}{b^{\frac{9}{2}}}$$

command

```
integrate(x**2*(D*x**6+C*x**4+B*x**2+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.13 Problem number 163

$$\int \frac{A+Bx^2+Cx^4+Dx^6}{(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{Ax}{a\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{(6Ab+Ba)\,x^3}{3a^2\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{\left(24A\,b^2+a(4bB+3aC)\right)x^5}{15a^3\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{\left(48A\,b^3+a\left(8b^2B+6abC+15a^2D\right)\right)x^7}{105a^4\,(b\,x^2+a)^{\frac{7}{2}}}$$

command

```
integrate((D*x**6+C*x**4+B*x**2+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.14 Problem number 164

$$\int \frac{A+Bx^2+Cx^4+Dx^6}{x^2\,(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$-\frac{A}{ax\,(b\,x^2+a)^{\frac{7}{2}}}-\frac{(8Ab-Ba)\,x}{a^2\,(b\,x^2+a)^{\frac{7}{2}}}-\frac{\left(48A\,b^2-a(6bB+aC)\right)x^3}{3a^3\,(b\,x^2+a)^{\frac{7}{2}}}-\frac{\left(4b\left(48A\,b^2-a(6bB+aC)\right)-3a^3D\right)x^5}{15a^4\,(b\,x^2+a)^{\frac{7}{2}}}-\frac{2b\left(4b\left(48A\,b^2-a(6bB+aC)\right)-3a^3D\right)x^7}{105a^5\,(b\,x^2+a)^{\frac{7}{2}}}$$

command

```
integrate((D*x**6+C*x**4+B*x**2+A)/x**2/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.15 Problem number 165

$$\int \frac{A + Bx^2 + Cx^4 + Dx^6}{x^4 (a + bx^2)^{9/2}} \, dx$$

Optimal antiderivative

$$-\frac{A}{3a\,x^3\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{10Ab-3Ba}{3a^2x\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{\left(80A\,b^2-3a(8bB-aC)\right)x}{3a^3\,(b\,x^2+a)^{\frac{7}{2}}} +\frac{\left(160A\,b^3-a\left(48b^2B-6abC-a^2D\right)\right)x^3}{3a^4\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{4b\left(160A\,b^3-a\left(48b^2B-6abC-a^2D\right)\right)x^5}{15a^5\,(b\,x^2+a)^{\frac{7}{2}}} +\frac{8b^2\left(160A\,b^3-a\left(48b^2B-6abC-a^2D\right)\right)x^7}{105a^6\,(b\,x^2+a)^{\frac{7}{2}}}$$

command

```
integrate((D*x**6+C*x**4+B*x**2+A)/x**4/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.16 Problem number 166

$$\int \frac{A + Bx^2 + Cx^4 + Dx^6}{x^6 (a + bx^2)^{9/2}} \, dx$$

Optimal antiderivative

$$-\frac{A}{5a\,x^5\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{12Ab-5Ba}{15a^2x^3\,(b\,x^2+a)^{\frac{7}{2}}}+\frac{-24A\,b^2+a(10bB-3aC)}{3a^3x\,(b\,x^2+a)^{\frac{7}{2}}} -\frac{\left(192A\,b^3-a\left(80b^2B-24abC+3a^2D\right)\right)x}{21a^4\,(b\,x^2+a)^{\frac{7}{2}}}-\frac{2\left(192A\,b^3-a\left(80b^2B-24abC+3a^2D\right)\right)x}{35a^5\,(b\,x^2+a)^{\frac{5}{2}}} -\frac{8\left(192A\,b^3-a\left(80b^2B-24abC+3a^2D\right)\right)x}{105a^6\,(b\,x^2+a)^{\frac{3}{2}}}-\frac{16\left(192A\,b^3-a\left(80b^2B-24abC+3a^2D\right)\right)x}{105a^7\sqrt{b\,x^2+a}}$$

command

```
integrate((D*x**6+C*x**4+B*x**2+A)/x**6/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.17 Problem number 172

$$\int \frac{x^2(A+Bx^2+Cx^4+Dx^6+Fx^8)}{(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{(A\,b^4-a(B\,b^3-C\,a\,b^2+D\,a^2b-F\,a^3))\,x^3}{7a\,b^4\,(b\,x^2+a)^{\frac{7}{2}}} + \frac{(4A\,b^4+a(3B\,b^3-10C\,a\,b^2+17D\,a^2b-24F\,a^3))\,x^3}{35a^2b^4\,(b\,x^2+a)^{\frac{5}{2}}} + \frac{(8A\,b^4+a(6B\,b^3+15C\,a\,b^2-71D\,a^2b+162F\,a^3))\,x^3}{105a^3b^4\,(b\,x^2+a)^{\frac{3}{2}}} + \frac{(2Db-9Fa)\,\mathrm{arctanh}\left(\frac{x\sqrt{b}}{\sqrt{b\,x^2+a}}\right)}{2b^{\frac{11}{2}}} - \frac{(Db-4Fa)\,x}{b^5\sqrt{b\,x^2+a}} + \frac{Fx\sqrt{b\,x^2+a}}{2b^5}$$

command

```
integrate(x**2*(F*x**8+D*x**6+C*x**4+B*x**2+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.18 Problem number 173

$$\int \frac{A+Bx^2+Cx^4+Dx^6+Fx^8}{(a+bx^2)^{9/2}}\,dx$$

Optimal antiderivative

$$\frac{(A\,b^4-F\,a^4)\,x}{a\,b^4\,(b\,x^2+a)^{\frac{7}{2}}} + \frac{(6A\,b^4+B\,a\,b^3-10F\,a^4)\,x^3}{3a^2b^3\,(b\,x^2+a)^{\frac{7}{2}}} + \frac{(24A\,b^4+a(4B\,b^3+3C\,a\,b^2-58F\,a^3))\,x^5}{15a^3b^2\,(b\,x^2+a)^{\frac{7}{2}}} + \frac{(48A\,b^4+a(8B\,b^3+6C\,a\,b^2+15D\,a^2b-176F\,a^3))\,x^7}{105a^4b\,(b\,x^2+a)^{\frac{7}{2}}} + \frac{F\,\mathrm{arctanh}\left(\frac{x\sqrt{b}}{\sqrt{b\,x^2+a}}\right)}{b^{\frac{9}{2}}}$$

command

```
integrate((F*x**8+D*x**6+C*x**4+B*x**2+A)/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

14.19 Problem number 174

$$\int \frac{A + Bx^2 + Cx^4 + Dx^6 + Fx^8}{x^2 \left(a + bx^2\right)^{9/2}}\, dx$$

Optimal antiderivative

$$-\frac{A}{ax\,(b\,x^2+a)^{\frac{7}{2}}} - \frac{(8Ab - Ba)\,x}{a^2\,(b\,x^2+a)^{\frac{7}{2}}} - \frac{\left(48A\,b^2 - a(6bB + aC)\right)x^3}{3a^3\,(b\,x^2+a)^{\frac{7}{2}}} - \frac{\left(192A\,b^3 - a\left(24b^2B + 4abC + 3a^2D\right)\right)x^5}{15a^4\,(b\,x^2+a)^{\frac{7}{2}}} - \frac{\left(384A\,b^4 - a\left(48B\,b^3 + 8Ca\,b^2 + 6Da^2b + 15F\,a^3\right)\right)x^7}{105a^5\,(b\,x^2+a)^{\frac{7}{2}}}$$

command

```
integrate((F*x**8+D*x**6+C*x**4+B*x**2+A)/x**2/(b*x**2+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

15 Test file number 25

Test folder name:

```
test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.3_General/25_1.1.3.2-c_x-
^m-a+b_x^n-^p
```

15.1 Problem number 590

$$\int \frac{x^m}{(a+bx^3)^3}\,dx$$

Optimal antiderivative

$$\frac{x^{1+m}\,\mathrm{hypergeom}\left(\left[3,\frac{1}{3}+\frac{m}{3}\right],\left[\frac{4}{3}+\frac{m}{3}\right],-\frac{b\,x^3}{a}\right)}{a^3\,(1+m)}$$

command

```
integrate(x**m/(b*x**3+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

15.2 Problem number 598

$$\int (cx)^m\,(a+bx^3)^p\,dx$$

Optimal antiderivative

$$\frac{(cx)^{1+m}\,(b\,x^3+a)^p\,\mathrm{hypergeom}\left(\left[-p,\frac{1}{3}+\frac{m}{3}\right],\left[\frac{4}{3}+\frac{m}{3}\right],-\frac{b\,x^3}{a}\right)\left(1+\frac{b\,x^3}{a}\right)^{-p}}{c\,(1+m)}$$

command

```
integrate((c*x)**m*(b*x**3+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^p c^m x x^m \Gamma\left(\frac{m}{3}+\frac{1}{3}\right)\,{}_2F_1\left(\left.\begin{matrix}-p,\ \frac{m}{3}+\frac{1}{3}\\ \frac{m}{3}+\frac{4}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{m}{3}+\frac{4}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.3 Problem number 738

$$\int \frac{x^{9/2}}{a+cx^4}\,dx$$

Optimal antiderivative

$$\frac{2x^{\frac{3}{2}}}{3c}+\frac{(-a)^{\frac{3}{8}}\arctan\left(\frac{c^{\frac{1}{8}}\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)}{2c^{\frac{11}{8}}}-\frac{(-a)^{\frac{3}{8}}\operatorname{arctanh}\left(\frac{c^{\frac{1}{8}}\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)}{2c^{\frac{11}{8}}}
-\frac{(-a)^{\frac{3}{8}}\arctan\left(-1+\frac{c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)\sqrt{2}}{4c^{\frac{11}{8}}}-\frac{(-a)^{\frac{3}{8}}\arctan\left(1+\frac{c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)\sqrt{2}}{4c^{\frac{11}{8}}}
-\frac{(-a)^{\frac{3}{8}}\ln\left((-a)^{\frac{1}{4}}+c^{\frac{1}{4}}x-(-a)^{\frac{1}{8}}c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{8c^{\frac{11}{8}}}
+\frac{(-a)^{\frac{3}{8}}\ln\left((-a)^{\frac{1}{4}}+c^{\frac{1}{4}}x+(-a)^{\frac{1}{8}}c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{8c^{\frac{11}{8}}}$$

command

```
integrate(x**(9/2)/(c*x**4+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}x^{\frac{3}{2}} \\ \frac{2x^{\frac{11}{2}}}{11a} \\ \frac{2x^{\frac{3}{2}}}{3c} \\ \frac{2x^{\frac{3}{2}}}{3c}+\frac{\left(-\frac{a}{c}\right)^{\frac{3}{8}}\log\left(\sqrt{x}-\sqrt[8]{-\frac{a}{c}}\right)}{4c}-\frac{\left(-\frac{a}{c}\right)^{\frac{3}{8}}\log\left(\sqrt{x}+\sqrt[8]{-\frac{a}{c}}\right)}{4c}-\frac{\sqrt{2}\left(-\frac{a}{c}\right)^{\frac{3}{8}}\log\left(-4\sqrt{2}\sqrt{x}\sqrt[8]{-\frac{a}{c}}+4x+4\sqrt[4]{-\frac{a}{c}}\right)}{8c}+\frac{\sqrt{2}\,(}{} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.4 Problem number 745

$$\int \frac{1}{x^{5/2}\,(a+cx^4)}\,dx$$

Optimal antiderivative

$$-\frac{2}{3a\,x^{\frac{3}{2}}}-\frac{c^{\frac{3}{8}}\arctan\left(\frac{c^{\frac{1}{8}}\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)}{2\,(-a)^{\frac{11}{8}}}-\frac{c^{\frac{3}{8}}\operatorname{arctanh}\left(\frac{c^{\frac{1}{8}}\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)}{2\,(-a)^{\frac{11}{8}}}+\frac{c^{\frac{3}{8}}\arctan\left(-1+\frac{c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)\sqrt{2}}{4\,(-a)^{\frac{11}{8}}}$$
$$+\frac{c^{\frac{3}{8}}\arctan\left(1+\frac{c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}}{(-a)^{\frac{1}{8}}}\right)\sqrt{2}}{4\,(-a)^{\frac{11}{8}}}-\frac{c^{\frac{3}{8}}\ln\left((-a)^{\frac{1}{4}}+c^{\frac{1}{4}}x-(-a)^{\frac{1}{8}}\,c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{8\,(-a)^{\frac{11}{8}}}$$
$$+\frac{c^{\frac{3}{8}}\ln\left((-a)^{\frac{1}{4}}+c^{\frac{1}{4}}x+(-a)^{\frac{1}{8}}\,c^{\frac{1}{8}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{8\,(-a)^{\frac{11}{8}}}$$

command

```
integrate(1/x**(5/2)/(c*x**4+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{\tilde{\infty}}{x^{\frac{11}{2}}}\\ -\frac{2}{11cx^{\frac{11}{2}}}\\ -\frac{2}{3ax^{\frac{3}{2}}}\\ -\frac{\log\left(\sqrt{x}-\sqrt[8]{-\frac{a}{c}}\right)}{4a\left(-\frac{a}{c}\right)^{\frac{3}{8}}}+\frac{\log\left(\sqrt{x}+\sqrt[8]{-\frac{a}{c}}\right)}{4a\left(-\frac{a}{c}\right)^{\frac{3}{8}}}+\frac{\sqrt{2}\log\left(-4\sqrt{2}\,\sqrt{x}\,\sqrt[8]{-\frac{a}{c}}+4x+4\sqrt[4]{-\frac{a}{c}}\right)}{8a\left(-\frac{a}{c}\right)^{\frac{3}{8}}}-\frac{\sqrt{2}\log\left(4\sqrt{2}\,\sqrt{x}\,\sqrt[8]{-\frac{a}{c}}+4x-\right.}{8a\left(-\frac{a}{c}\right)^{\frac{3}{8}}}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.5 Problem number 1483

$$\int \frac{x^4}{1-x^8}\,dx$$

Optimal antiderivative

$$\frac{\arctan(x)}{4}+\frac{\operatorname{arctanh}(x)}{4}-\frac{\arctan\left(-1+x\sqrt{2}\right)\sqrt{2}}{8}-\frac{\arctan\left(1+x\sqrt{2}\right)\sqrt{2}}{8}$$
$$+\frac{\ln\left(1+x^2-x\sqrt{2}\right)\sqrt{2}}{16}-\frac{\ln\left(1+x^2+x\sqrt{2}\right)\sqrt{2}}{16}$$

command

```
integrate(x**4/(-x**8+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\log(x-1)}{8}+\frac{\log(x+1)}{8}-\frac{i\log(x-i)}{8}+\frac{i\log(x+i)}{8} - \operatorname{RootSum}\left(4096t^4+1,\left(t\mapsto t\log\left(-32768t^5+x\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.6 Problem number 1484

$$\int \frac{x^2}{1-x^8}\,dx$$

Optimal antiderivative

$$-\frac{\arctan(x)}{4}+\frac{\operatorname{arctanh}(x)}{4}+\frac{\arctan\left(-1+x\sqrt{2}\right)\sqrt{2}}{8}+\frac{\arctan\left(1+x\sqrt{2}\right)\sqrt{2}}{8} + \frac{\ln\left(1+x^2-x\sqrt{2}\right)\sqrt{2}}{16}-\frac{\ln\left(1+x^2+x\sqrt{2}\right)\sqrt{2}}{16}$$

command

```
integrate(x**2/(-x**8+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\log(x-1)}{8}+\frac{\log(x+1)}{8}+\frac{i\log(x-i)}{8}-\frac{i\log(x+i)}{8} - \operatorname{RootSum}\left(4096t^4+1,\left(t\mapsto t\log\left(-512t^3+x\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.7 Problem number 1485

$$\int \frac{1}{1-x^8}\,dx$$

Optimal antiderivative

$$\frac{\arctan(x)}{4}+\frac{\operatorname{arctanh}(x)}{4}+\frac{\arctan\left(-1+x\sqrt{2}\right)\sqrt{2}}{8}+\frac{\arctan\left(1+x\sqrt{2}\right)\sqrt{2}}{8}-\frac{\ln\left(1+x^2-x\sqrt{2}\right)\sqrt{2}}{16}+\frac{\ln\left(1+x^2+x\sqrt{2}\right)\sqrt{2}}{16}$$

command

```
integrate(1/(-x**8+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\log(x-1)}{8}+\frac{\log(x+1)}{8}-\frac{i\log(x-i)}{8}+\frac{i\log(x+i)}{8}-\operatorname{RootSum}\left(4096t^4+1,\left(t\mapsto t\log(-8t+x)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.8 Problem number 1486

$$\int \frac{1}{x^2(1-x^8)}\,dx$$

Optimal antiderivative

$$-\frac{1}{x}-\frac{\arctan(x)}{4}+\frac{\operatorname{arctanh}(x)}{4}-\frac{\arctan\left(-1+x\sqrt{2}\right)\sqrt{2}}{8}-\frac{\arctan\left(1+x\sqrt{2}\right)\sqrt{2}}{8}-\frac{\ln\left(1+x^2-x\sqrt{2}\right)\sqrt{2}}{16}+\frac{\ln\left(1+x^2+x\sqrt{2}\right)\sqrt{2}}{16}$$

command

```
integrate(1/x**2/(-x**8+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\log(x-1)}{8}+\frac{\log(x+1)}{8}+\frac{i\log(x-i)}{8}-\frac{i\log(x+i)}{8}-\operatorname{RootSum}\left(4096t^4+1,\left(t\mapsto t\log\left(-2097152t^7+x\right)\right)\right)-\frac{1}{x}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.9 Problem number 1487

$$\int \frac{1}{x^4 (1 - x^8)} \, dx$$

Optimal antiderivative

$$-\frac{1}{3x^3} + \frac{\arctan(x)}{4} + \frac{\operatorname{arctanh}(x)}{4} - \frac{\arctan\left(-1 + x\sqrt{2}\right)\sqrt{2}}{8} - \frac{\arctan\left(1 + x\sqrt{2}\right)\sqrt{2}}{8} + \frac{\ln\left(1 + x^2 - x\sqrt{2}\right)\sqrt{2}}{16} - \frac{\ln\left(1 + x^2 + x\sqrt{2}\right)\sqrt{2}}{16}$$

command

```
integrate(1/x**4/(-x**8+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\log(x-1)}{8} + \frac{\log(x+1)}{8} - \frac{i\log(x-i)}{8} + \frac{i\log(x+i)}{8} - \operatorname{RootSum}\left(4096t^4 + 1, \left(t \mapsto t\log\left(-32768t^5 + x\right)\right)\right) - \frac{1}{3x^3}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.10 Problem number 1673

$$\int \frac{x^{5/2}}{\left(a + \frac{b}{x}\right)^2} \, dx$$

Optimal antiderivative

$$\frac{3b^2 x^{\frac{3}{2}}}{a^4} - \frac{9b\,x^{\frac{5}{2}}}{5a^3} + \frac{9x^{\frac{7}{2}}}{7a^2} - \frac{x^{\frac{9}{2}}}{a\,(ax+b)} + \frac{9b^{\frac{7}{2}} \arctan\left(\frac{\sqrt{a}\,\sqrt{x}}{\sqrt{b}}\right)}{a^{\frac{11}{2}}} - \frac{9b^3\sqrt{x}}{a^5}$$

command

```
integrate(x**(5/2)/(a+b/x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty} x^{\frac{11}{2}} \\ \frac{2x^{\frac{11}{2}}}{11b^2} \\ \frac{2x^{\frac{7}{2}}}{7a^2} \\ \frac{20a^5x^{\frac{9}{2}}\sqrt{-\frac{b}{a}}}{70a^7x\sqrt{-\frac{b}{a}}+70a^6b\sqrt{-\frac{b}{a}}} - \frac{36a^4bx^{\frac{7}{2}}\sqrt{-\frac{b}{a}}}{70a^7x\sqrt{-\frac{b}{a}}+70a^6b\sqrt{-\frac{b}{a}}} + \frac{84a^3b^2x^{\frac{5}{2}}\sqrt{-\frac{b}{a}}}{70a^7x\sqrt{-\frac{b}{a}}+70a^6b\sqrt{-\frac{b}{a}}} - \frac{420a^2b^3x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}}{70a^7x\sqrt{-\frac{b}{a}}+70a^6b\sqrt{-\frac{b}{a}}} - \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.11 Problem number 1679

$$\int \frac{1}{\left(a+\frac{b}{x}\right)^2 x^{7/2}}\,dx$$

Optimal antiderivative

$$-\frac{3\arctan\left(\frac{\sqrt{a}\,\sqrt{x}}{\sqrt{b}}\right)\sqrt{a}}{b^{\frac{5}{2}}}-\frac{3}{b^2\sqrt{x}}+\frac{1}{b\,(ax+b)\,\sqrt{x}}$$

command

```
integrate(1/(a+b/x)**2/x**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{\sqrt{x}} \\ -\frac{2}{b^2\sqrt{x}} \\ -\frac{2}{5a^2x^{\frac{5}{2}}} \\ -\frac{3ax^{\frac{3}{2}}\log\left(\sqrt{x}-\sqrt{-\frac{b}{a}}\right)}{2ab^2x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}+2b^3\sqrt{x}\sqrt{-\frac{b}{a}}} + \frac{3ax^{\frac{3}{2}}\log\left(\sqrt{x}+\sqrt{-\frac{b}{a}}\right)}{2ab^2x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}+2b^3\sqrt{x}\sqrt{-\frac{b}{a}}} - \frac{6ax\sqrt{-\frac{b}{a}}}{2ab^2x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}+2b^3\sqrt{x}\sqrt{-\frac{b}{a}}} - \frac{3b\sqrt{x}\log\left(\sqrt{x}-\right.}{2ab^2x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}+2b^3\sqrt{}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.12 Problem number 1680

$$\int \frac{1}{\left(a+\frac{b}{x}\right)^2 x^{9/2}}\,dx$$

Optimal antiderivative

$$-\frac{5}{3b^2x^{\frac{3}{2}}}+\frac{1}{b\,x^{\frac{3}{2}}\,(ax+b)}+\frac{5a^{\frac{3}{2}}\arctan\left(\frac{\sqrt{a}\,\sqrt{x}}{\sqrt{b}}\right)}{b^{\frac{7}{2}}}+\frac{5a}{b^3\sqrt{x}}$$

command

```
integrate(1/(a+b/x)**2/x**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{x^{\frac{3}{2}}} \\ -\frac{2}{3b^2x^{\frac{3}{2}}} \\ -\frac{2}{7a^2x^{\frac{7}{2}}} \\ \frac{15a^2x^{\frac{5}{2}}\log\left(\sqrt{x}-\sqrt{-\frac{b}{a}}\right)}{6ab^3x^{\frac{5}{2}}\sqrt{-\frac{b}{a}}+6b^4x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}}-\frac{15a^2x^{\frac{5}{2}}\log\left(\sqrt{x}+\sqrt{-\frac{b}{a}}\right)}{6ab^3x^{\frac{5}{2}}\sqrt{-\frac{b}{a}}+6b^4x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}}+\frac{30a^2x^2\sqrt{-\frac{b}{a}}}{6ab^3x^{\frac{5}{2}}\sqrt{-\frac{b}{a}}+6b^4x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}}+\frac{15abx^{\frac{3}{2}}\log\left(\sqrt{x}-\sqrt{-\frac{b}{a}}\right)}{6ab^3x^{\frac{5}{2}}\sqrt{-\frac{b}{a}}+6b^4x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.13 Problem number 1682

$$\int \frac{x^{3/2}}{\left(a+\frac{b}{x}\right)^3}\,dx$$

Optimal antiderivative

$$-\frac{21b\,x^{\frac{3}{2}}}{4a^4}+\frac{63x^{\frac{5}{2}}}{20a^3}-\frac{x^{\frac{9}{2}}}{2a\,(ax+b)^2}-\frac{9x^{\frac{7}{2}}}{4a^2\,(ax+b)}-\frac{63b^{\frac{5}{2}}\arctan\left(\frac{\sqrt{a}\,\sqrt{x}}{\sqrt{b}}\right)}{4a^{\frac{11}{2}}}+\frac{63b^2\sqrt{x}}{4a^5}$$

command

```
integrate(x**(3/2)/(a+b/x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty} x^{\frac{11}{2}} \\ \frac{2x^{\frac{5}{2}}}{5a^3} \\ \frac{2x^{\frac{11}{2}}}{11b^3} \\ \frac{16a^5x^{\frac{9}{2}}\sqrt{-\frac{b}{a}}}{40a^8x^2\sqrt{-\frac{b}{a}}+80a^7bx\sqrt{-\frac{b}{a}}+40a^6b^2\sqrt{-\frac{b}{a}}} - \frac{48a^4bx^{\frac{7}{2}}\sqrt{-\frac{b}{a}}}{40a^8x^2\sqrt{-\frac{b}{a}}+80a^7bx\sqrt{-\frac{b}{a}}+40a^6b^2\sqrt{-\frac{b}{a}}} + \frac{336a^3b^2x^{\frac{5}{2}}\sqrt{-\frac{b}{a}}}{40a^8x^2\sqrt{-\frac{b}{a}}+80a^7bx\sqrt{-\frac{b}{a}}+4} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.14 Problem number 1686

$$\int \frac{1}{\left(a+\frac{b}{x}\right)^3 x^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{\sqrt{a}\,\sqrt{x}}{\sqrt{b}}\right)}{4a^{\frac{3}{2}}b^{\frac{3}{2}}} - \frac{\sqrt{x}}{2a\,(ax+b)^2} + \frac{\sqrt{x}}{4ab\,(ax+b)}$$

command

```
integrate(1/(a+b/x)**3/x**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty} x^{\frac{3}{2}} \\ \frac{2x^{\frac{3}{2}}}{3b^3} \\ -\frac{2}{3a^3x^{\frac{3}{2}}} \\ \frac{2a^2x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}}{8a^4bx^2\sqrt{-\frac{b}{a}}+16a^3b^2x\sqrt{-\frac{b}{a}}+8a^2b^3\sqrt{-\frac{b}{a}}} + \frac{a^2x^2\log\left(\sqrt{x}-\sqrt{-\frac{b}{a}}\right)}{8a^4bx^2\sqrt{-\frac{b}{a}}+16a^3b^2x\sqrt{-\frac{b}{a}}+8a^2b^3\sqrt{-\frac{b}{a}}} - \frac{a^2x^2\log\left(\sqrt{x}+\sqrt{-\frac{b}{a}}\right.}{8a^4bx^2\sqrt{-\frac{b}{a}}+16a^3b^2x\sqrt{-\frac{b}{a}}+} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.15 Problem number 1687

$$\int \frac{1}{\left(a+\frac{b}{x}\right)^3 x^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{3\arctan\left(\frac{\sqrt{a}\,\sqrt{x}}{\sqrt{b}}\right)}{4b^{\frac{5}{2}}\sqrt{a}}+\frac{\sqrt{x}}{2b\,(ax+b)^2}+\frac{3\sqrt{x}}{4b^2\,(ax+b)}$$

command

```
integrate(1/(a+b/x)**3/x**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\sqrt{x} \\ -\frac{2}{5a^3x^{\frac{5}{2}}} \\ \frac{2\sqrt{x}}{b^3} \\ \frac{6a^2x^{\frac{3}{2}}\sqrt{-\frac{b}{a}}}{8a^3b^2x^2\sqrt{-\frac{b}{a}}+16a^2b^3x\sqrt{-\frac{b}{a}}+8ab^4\sqrt{-\frac{b}{a}}}+\frac{3a^2x^2\log\left(\sqrt{x}-\sqrt{-\frac{b}{a}}\right)}{8a^3b^2x^2\sqrt{-\frac{b}{a}}+16a^2b^3x\sqrt{-\frac{b}{a}}+8ab^4\sqrt{-\frac{b}{a}}}-\frac{3a^2x^2\log\left(\sqrt{x}+\sqrt{-\frac{b}{a}}\right)}{8a^3b^2x^2\sqrt{-\frac{b}{a}}+16a^2b^3x\sqrt{-\frac{b}{a}}+\cdots} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.16 Problem number 2266

$$\int \left(a+b\sqrt{x}\right)^p x\,dx$$

Optimal antiderivative

$$-\frac{2a^3\left(a+b\sqrt{x}\right)^{1+p}}{b^4\,(1+p)}+\frac{6a^2\left(a+b\sqrt{x}\right)^{2+p}}{b^4\,(2+p)}-\frac{6a\left(a+b\sqrt{x}\right)^{3+p}}{b^4\,(3+p)}+\frac{2\left(a+b\sqrt{x}\right)^{4+p}}{b^4\,(4+p)}$$

command

```
integrate(x*(a+b*x**(1/2))**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

15.17 Problem number 2276

$$\int \frac{x^8}{\left(a+bx^{3/2}\right)^{2/3}}\,dx$$

Optimal antiderivative

$$-\frac{2a^5\left(a+b\,x^{\frac{3}{2}}\right)^{\frac{1}{3}}}{b^6}+\frac{5a^4\left(a+b\,x^{\frac{3}{2}}\right)^{\frac{4}{3}}}{2b^6}-\frac{20a^3\left(a+b\,x^{\frac{3}{2}}\right)^{\frac{7}{3}}}{7b^6}+\frac{2a^2\left(a+b\,x^{\frac{3}{2}}\right)^{\frac{10}{3}}}{b^6}-\frac{10a\left(a+b\,x^{\frac{3}{2}}\right)^{\frac{13}{3}}}{13b^6}+\frac{\left(a+b\,x^{\frac{3}{2}}\right)^{\frac{16}{3}}}{8b^6}$$

command

```
integrate(x**8/(a+b*x**(3/2))**(2/3),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{729a^5\sqrt[3]{a+bx^{\frac{3}{2}}}}{728b^6}+\frac{243a^4x^{\frac{3}{2}}\sqrt[3]{a+bx^{\frac{3}{2}}}}{728b^5}-\frac{81a^3x^3\sqrt[3]{a+bx^{\frac{3}{2}}}}{364b^4}+\frac{9a^2x^{\frac{9}{2}}\sqrt[3]{a+bx^{\frac{3}{2}}}}{52b^3}-\frac{15ax^6\sqrt[3]{a+bx^{\frac{3}{2}}}}{104b^2}+\frac{x^{\frac{15}{2}}\sqrt[3]{a+b}}{8b} \\ \frac{x^9}{9a^{\frac{2}{3}}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.18 Problem number 2546

$$\int x^{-1-3n}\left(a+bx^n\right)^3\,dx$$

Optimal antiderivative

$$-\frac{a^3x^{-3n}}{3n}-\frac{3a^2b\,x^{-2n}}{2n}-\frac{3a\,b^2x^{-n}}{n}+b^3\ln\left(x\right)$$

command

```
integrate(x**(-1-3*n)*(a+b*x**n)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^3x+\frac{9a^2bx^{\frac{2}{3}}}{2}+9ab^2\sqrt[3]{x}+b^3\log\left(x\right) \\ \left(a+b\right)^3\log\left(x\right) \\ -\frac{6a^3n}{18n^2x^{3n}+6nx^{3n}}-\frac{2a^3}{18n^2x^{3n}+6nx^{3n}}-\frac{27a^2bnx^n}{18n^2x^{3n}+6nx^{3n}}-\frac{9a^2bx^n}{18n^2x^{3n}+6nx^{3n}}-\frac{54ab^2nx^{2n}}{18n^2x^{3n}+6nx^{3n}}-\frac{18ab^2x^{2n}}{18n^2x^{3n}+6nx^{3n}}+\frac{18b^3nx^{3n}\log\left(x\right.}{18n^2x^{3n}+6nx} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.19 Problem number 2556

$$\int x^{-1-n}(a+bx^n)^5\,dx$$

Optimal antiderivative

$$-\frac{a^5x^{-n}}{n}+\frac{10a^3b^2x^n}{n}+\frac{5a^2b^3x^{2n}}{n}+\frac{5a\,b^4x^{3n}}{3n}+\frac{b^5x^{4n}}{4n}+5a^4b\ln(x)$$

command

```
integrate(x**(-1-n)*(a+b*x**n)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^5x+5a^4b\log(x)-\frac{10a^3b^2}{x}-\frac{5a^2b^3}{x^2}-\frac{5ab^4}{3x^3}-\frac{b^5}{4x^4} \\ (a+b)^5\log(x) \\ -\frac{12a^5n}{12n^2x^n+12nx^n}-\frac{12a^5}{12n^2x^n+12nx^n}-\frac{60a^4bnx^n\log(x^{-n})}{12n^2x^n+12nx^n}+\frac{60a^4bnx^n}{12n^2x^n+12nx^n}-\frac{60a^4bx^n\log(x^{-n})}{12n^2x^n+12nx^n}+\frac{120a^3b^2nx^{2n}}{12n^2x^n+12nx^n}+\frac{120a^3b^2x^{2n}}{12n^2x^n+12n} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.20 Problem number 2557

$$\int x^{-1-2n}(a+bx^n)^5\,dx$$

Optimal antiderivative

$$-\frac{a^5x^{-2n}}{2n}-\frac{5a^4b\,x^{-n}}{n}+\frac{10a^2b^3x^n}{n}+\frac{5a\,b^4x^{2n}}{2n}+\frac{b^5x^{3n}}{3n}+10a^3b^2\ln(x)$$

command

```
integrate(x**(-1-2*n)*(a+b*x**n)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^5x+10a^4b\sqrt{x}+10a^3b^2\log(x)-\frac{20a^2b^3}{\sqrt{x}}-\frac{5ab^4}{x}-\frac{2b^5}{3x^{\frac{3}{2}}} \\ (a+b)^5\log(x) \\ -\frac{6a^5n}{12n^2x^{2n}+6nx^{2n}}-\frac{3a^5}{12n^2x^{2n}+6nx^{2n}}-\frac{60a^4bnx^n}{12n^2x^{2n}+6nx^{2n}}-\frac{30a^4bx^n}{12n^2x^{2n}+6nx^{2n}}+\frac{120a^3b^2nx^{2n}\log(x^n)}{12n^2x^{2n}+6nx^{2n}}+\frac{60a^3b^2nx^{2n}}{12n^2x^{2n}+6nx^{2n}}+\frac{60a^3b^2x^{2n}}{12n^2x^{2n}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.21 Problem number 2558

$$\int x^{-1-3n}(a+bx^n)^5\,dx$$

Optimal antiderivative

$$-\frac{a^5x^{-3n}}{3n}-\frac{5a^4b\,x^{-2n}}{2n}-\frac{10a^3b^2x^{-n}}{n}+\frac{5a\,b^4x^n}{n}+\frac{b^5x^{2n}}{2n}+10a^2b^3\ln(x)$$

command

```
integrate(x**(-1-3*n)*(a+b*x**n)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^5x+\frac{15a^4bx^{\frac{2}{3}}}{2}+30a^3b^2\sqrt[3]{x}+10a^2b^3\log(x)-\frac{15ab^4}{\sqrt[3]{x}}-\frac{3b^5}{2x^{\frac{2}{3}}} \\ (a+b)^5\log(x) \\ -\frac{6a^5n}{18n^2x^{3n}+6nx^{3n}}-\frac{2a^5}{18n^2x^{3n}+6nx^{3n}}-\frac{45a^4bnx^n}{18n^2x^{3n}+6nx^{3n}}-\frac{15a^4bx^n}{18n^2x^{3n}+6nx^{3n}}-\frac{180a^3b^2nx^{2n}}{18n^2x^{3n}+6nx^{3n}}-\frac{60a^3b^2x^{2n}}{18n^2x^{3n}+6nx^{3n}}+\frac{180a^2b^3nx^{3n}\,\mathrm{lo}}{18n^2x^{3n}+6n} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.22 Problem number 2559

$$\int x^{-1-4n}(a+bx^n)^5\,dx$$

Optimal antiderivative

$$-\frac{a^5x^{-4n}}{4n}-\frac{5a^4b\,x^{-3n}}{3n}-\frac{5a^3b^2x^{-2n}}{n}-\frac{10a^2b^3x^{-n}}{n}+\frac{b^5x^n}{n}+5a\,b^4\ln(x)$$

command

```
integrate(x**(-1-4*n)*(a+b*x**n)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^5x+\frac{20a^4bx^{\frac{3}{4}}}{3}+20a^3b^2\sqrt{x}+40a^2b^3\sqrt[4]{x}-20ab^4\log\left(\frac{1}{\sqrt[4]{x}}\right)-\frac{4b^5}{\sqrt[4]{x}} \\ (a+b)^5\log(x) \\ -\frac{12a^5n}{48n^2x^{4n}+12nx^{4n}}-\frac{3a^5}{48n^2x^{4n}+12nx^{4n}}-\frac{80a^4bnx^n}{48n^2x^{4n}+12nx^{4n}}-\frac{20a^4bx^n}{48n^2x^{4n}+12nx^{4n}}-\frac{240a^3b^2nx^{2n}}{48n^2x^{4n}+12nx^{4n}}-\frac{60a^3b^2x^{2n}}{48n^2x^{4n}+12nx^{4n}}-\frac{480a^2}{48n^2x^{4n}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.23 Problem number 2562

$$\int x^{-1-7n}(a+bx^n)^5\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^6\,x^{-7n}}{7an}+\frac{b(a+b\,x^n)^6\,x^{-6n}}{42a^2n}$$

command

integrate(x(-1-7*n)*(a+b*x**n)**5,x)**

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^5x^{-7n}}{7n}-\frac{5a^4bx^{-6n}}{6n}-\frac{2a^3b^2x^{-5n}}{n}-\frac{5a^2b^3x^{-4n}}{2n}-\frac{5ab^4x^{-3n}}{3n}-\frac{b^5x^{-2n}}{2n} & \text{for } n\neq 0\\ (a+b)^5\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.24 Problem number 2563

$$\int x^{-1-8n}(a+bx^n)^5\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^6\,x^{-8n}}{8an}+\frac{b(a+b\,x^n)^6\,x^{-7n}}{28a^2n}-\frac{b^2(a+b\,x^n)^6\,x^{-6n}}{168a^3n}$$

command

integrate(x(-1-8*n)*(a+b*x**n)**5,x)**

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^5x^{-8n}}{8n}-\frac{5a^4bx^{-7n}}{7n}-\frac{5a^3b^2x^{-6n}}{3n}-\frac{2a^2b^3x^{-5n}}{n}-\frac{5ab^4x^{-4n}}{4n}-\frac{b^5x^{-3n}}{3n} & \text{for } n\neq 0\\ (a+b)^5\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.25 Problem number 2566

$$\int x^{-1+9n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$\frac{a^8x^{9n}}{9n}+\frac{4a^7b\,x^{10n}}{5n}+\frac{28a^6b^2x^{11n}}{11n}+\frac{14a^5b^3x^{12n}}{3n}+\frac{70a^4b^4x^{13n}}{13n}+\frac{4a^3b^5x^{14n}}{n}+\frac{28a^2b^6x^{15n}}{15n}+\frac{a\,b^7x^{16n}}{2n}+\frac{b^8x^{17n}}{17n}$$

command

```
integrate(x**(-1+9*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{a^8x^{9n}}{9n}+\frac{4a^7bx^{10n}}{5n}+\frac{28a^6b^2x^{11n}}{11n}+\frac{14a^5b^3x^{12n}}{3n}+\frac{70a^4b^4x^{13n}}{13n}+\frac{4a^3b^5x^{14n}}{n}+\frac{28a^2b^6x^{15n}}{15n}+\frac{ab^7x^{16n}}{2n}+\frac{b^8x^{17n}}{17n} & \text{for } n\neq 0\\ (a+b)^8\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.26 Problem number 2567

$$\int x^{-1+8n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$\frac{a^8x^{8n}}{8n}+\frac{8a^7b\,x^{9n}}{9n}+\frac{14a^6b^2x^{10n}}{5n}+\frac{56a^5b^3x^{11n}}{11n}+\frac{35a^4b^4x^{12n}}{6n}+\frac{56a^3b^5x^{13n}}{13n}+\frac{2a^2b^6x^{14n}}{n}+\frac{8a\,b^7x^{15n}}{15n}+\frac{b^8x^{16n}}{16n}$$

command

```
integrate(x**(-1+8*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{a^8x^{8n}}{8n}+\frac{8a^7bx^{9n}}{9n}+\frac{14a^6b^2x^{10n}}{5n}+\frac{56a^5b^3x^{11n}}{11n}+\frac{35a^4b^4x^{12n}}{6n}+\frac{56a^3b^5x^{13n}}{13n}+\frac{2a^2b^6x^{14n}}{n}+\frac{8ab^7x^{15n}}{15n}+\frac{b^8x^{16n}}{16n} & \text{for } n\neq 0\\ (a+b)^8\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.27 Problem number 2568

$$\int x^{-1+7n}(a+bx^n)^8 \, dx$$

Optimal antiderivative

$$\frac{a^6(a+b\,x^n)^9}{9b^7n}-\frac{3a^5(a+b\,x^n)^{10}}{5b^7n}+\frac{15a^4(a+b\,x^n)^{11}}{11b^7n}-\frac{5a^3(a+b\,x^n)^{12}}{3b^7n}+\frac{15a^2(a+b\,x^n)^{13}}{13b^7n}-\frac{3a(a+b\,x^n)^{14}}{7b^7n}+\frac{(a+b\,x^n)^{15}}{15b^7n}$$

command

```
integrate(x**(-1+7*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a^8x^{7n}}{7n}+\frac{a^7bx^{8n}}{n}+\frac{28a^6b^2x^{9n}}{9n}+\frac{28a^5b^3x^{10n}}{5n}+\frac{70a^4b^4x^{11n}}{11n}+\frac{14a^3b^5x^{12n}}{3n}+\frac{28a^2b^6x^{13n}}{13n}+\frac{4ab^7x^{14n}}{7n}+\frac{b^8x^{15n}}{15n} & \text{for } n\neq 0 \\ (a+b)^8\log(x) & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.28 Problem number 2569

$$\int x^{-1+6n}(a+bx^n)^8 \, dx$$

Optimal antiderivative

$$-\frac{a^5(a+b\,x^n)^9}{9b^6n}+\frac{a^4(a+b\,x^n)^{10}}{2b^6n}-\frac{10a^3(a+b\,x^n)^{11}}{11b^6n}+\frac{5a^2(a+b\,x^n)^{12}}{6b^6n}-\frac{5a(a+b\,x^n)^{13}}{13b^6n}+\frac{(a+b\,x^n)^{14}}{14b^6n}$$

command

```
integrate(x**(-1+6*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a^8x^{6n}}{6n}+\frac{8a^7bx^{7n}}{7n}+\frac{7a^6b^2x^{8n}}{2n}+\frac{56a^5b^3x^{9n}}{9n}+\frac{7a^4b^4x^{10n}}{n}+\frac{56a^3b^5x^{11n}}{11n}+\frac{7a^2b^6x^{12n}}{3n}+\frac{8ab^7x^{13n}}{13n}+\frac{b^8x^{14n}}{14n} & \text{for } n\neq 0 \\ (a+b)^8\log(x) & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.29 Problem number 2570

$$\int x^{-1+5n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$\frac{a^4(a+b\,x^n)^9}{9b^5n}-\frac{2a^3(a+b\,x^n)^{10}}{5b^5n}+\frac{6a^2(a+b\,x^n)^{11}}{11b^5n}-\frac{a(a+b\,x^n)^{12}}{3b^5n}+\frac{(a+b\,x^n)^{13}}{13b^5n}$$

command

```
integrate(x**(-1+5*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{a^8x^{5n}}{5n}+\frac{4a^7bx^{6n}}{3n}+\frac{4a^6b^2x^{7n}}{n}+\frac{7a^5b^3x^{8n}}{n}+\frac{70a^4b^4x^{9n}}{9n}+\frac{28a^3b^5x^{10n}}{5n}+\frac{28a^2b^6x^{11n}}{11n}+\frac{2ab^7x^{12n}}{3n}+\frac{b^8x^{13n}}{13n} & \text{for } n\neq 0\\ (a+b)^8\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.30 Problem number 2571

$$\int x^{-1+4n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{a^3(a+b\,x^n)^9}{9b^4n}+\frac{3a^2(a+b\,x^n)^{10}}{10b^4n}-\frac{3a(a+b\,x^n)^{11}}{11b^4n}+\frac{(a+b\,x^n)^{12}}{12b^4n}$$

command

```
integrate(x**(-1+4*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{a^8x^{4n}}{4n}+\frac{8a^7bx^{5n}}{5n}+\frac{14a^6b^2x^{6n}}{3n}+\frac{8a^5b^3x^{7n}}{n}+\frac{35a^4b^4x^{8n}}{4n}+\frac{56a^3b^5x^{9n}}{9n}+\frac{14a^2b^6x^{10n}}{5n}+\frac{8ab^7x^{11n}}{11n}+\frac{b^8x^{12n}}{12n} & \text{for } n\neq 0\\ (a+b)^8\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.31 Problem number 2572

$$\int x^{-1+3n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$\frac{a^2(a+b\,x^n)^9}{9b^3n}-\frac{a(a+b\,x^n)^{10}}{5b^3n}+\frac{(a+b\,x^n)^{11}}{11b^3n}$$

command

```
integrate(x**(-1+3*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{a^8x^{3n}}{3n}+\frac{2a^7bx^{4n}}{n}+\frac{28a^6b^2x^{5n}}{5n}+\frac{28a^5b^3x^{6n}}{3n}+\frac{10a^4b^4x^{7n}}{n}+\frac{7a^3b^5x^{8n}}{n}+\frac{28a^2b^6x^{9n}}{9n}+\frac{4ab^7x^{10n}}{5n}+\frac{b^8x^{11n}}{11n} & \text{for } n\neq 0\\ (a+b)^8\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.32 Problem number 2573

$$\int x^{-1+2n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{a(a+b\,x^n)^9}{9b^2n}+\frac{(a+b\,x^n)^{10}}{10b^2n}$$

command

```
integrate(x**(-1+2*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{a^8x^{2n}}{2n}+\frac{8a^7bx^{3n}}{3n}+\frac{7a^6b^2x^{4n}}{n}+\frac{56a^5b^3x^{5n}}{5n}+\frac{35a^4b^4x^{6n}}{3n}+\frac{8a^3b^5x^{7n}}{n}+\frac{7a^2b^6x^{8n}}{2n}+\frac{8ab^7x^{9n}}{9n}+\frac{b^8x^{10n}}{10n} & \text{for } n\neq 0\\ (a+b)^8\log(x) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.33 Problem number 2576

$$\int x^{-1-n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{a^8x^{-n}}{n}+\frac{28a^6b^2x^n}{n}+\frac{28a^5b^3x^{2n}}{n}+\frac{70a^4b^4x^{3n}}{3n}+\frac{14a^3b^5x^{4n}}{n}+\frac{28a^2b^6x^{5n}}{5n}+\frac{4a\,b^7x^{6n}}{3n}+\frac{b^8x^{7n}}{7n}+8a^7b\ln(x)$$

command

```
integrate(x**(-1-n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^8x+8a^7b\log(x)-\frac{28a^6b^2}{x}-\frac{28a^5b^3}{x^2}-\frac{70a^4b^4}{3x^3}-\frac{14a^3b^5}{x^4}-\frac{28a^2b^6}{5x^5}-\frac{4ab^7}{3x^6}-\frac{b^8}{7x^7} \\ (a+b)^8\log(x) \\ -\frac{105a^8n}{105n^2x^n+105nx^n}-\frac{105a^8}{105n^2x^n+105nx^n}-\frac{840a^7bnx^n\log(x^{-n})}{105n^2x^n+105nx^n}+\frac{840a^7bnx^n}{105n^2x^n+105nx^n}-\frac{840a^7bx^n\log(x^{-n})}{105n^2x^n+105nx^n}+\frac{2940a^6b^2nx^{2n}}{105n^2x^n+105nx^n}+ \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.34 Problem number 2584

$$\int x^{-1-9n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^9\,x^{-9n}}{9an}$$

command

```
integrate(x**(-1-9*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-9n}}{9n}-\frac{a^7bx^{-8n}}{n}-\frac{4a^6b^2x^{-7n}}{n}-\frac{28a^5b^3x^{-6n}}{3n}-\frac{14a^4b^4x^{-5n}}{n}-\frac{14a^3b^5x^{-4n}}{n}-\frac{28a^2b^6x^{-3n}}{3n}-\frac{4ab^7x^{-2n}}{n}-\frac{b^8x^{-n}}{n} & \text{for } n\neq 0 \\ (a+b)^8\log(x) & \text{otherwis} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.35 Problem number 2585

$$\int x^{-1-10n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^9\,x^{-10n}}{10an}+\frac{b(a+b\,x^n)^9\,x^{-9n}}{90a^2n}$$

command

`integrate(x**(-1-10*n)*(a+b*x**n)**8,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-10n}}{10n}-\frac{8a^7bx^{-9n}}{9n}-\frac{7a^6b^2x^{-8n}}{2n}-\frac{8a^5b^3x^{-7n}}{n}-\frac{35a^4b^4x^{-6n}}{3n}-\frac{56a^3b^5x^{-5n}}{5n}-\frac{7a^2b^6x^{-4n}}{n}-\frac{8ab^7x^{-3n}}{3n}-\frac{b^8x^{-2n}}{2n} & \text{for } n \neq \\ (a+b)^8\log(x) & \text{otherwis} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.36 Problem number 2586

$$\int x^{-1-11n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^9\,x^{-11n}}{11an}+\frac{b(a+b\,x^n)^9\,x^{-10n}}{55a^2n}-\frac{b^2(a+b\,x^n)^9\,x^{-9n}}{495a^3n}$$

command

`integrate(x**(-1-11*n)*(a+b*x**n)**8,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-11n}}{11n}-\frac{4a^7bx^{-10n}}{5n}-\frac{28a^6b^2x^{-9n}}{9n}-\frac{7a^5b^3x^{-8n}}{n}-\frac{10a^4b^4x^{-7n}}{n}-\frac{28a^3b^5x^{-6n}}{3n}-\frac{28a^2b^6x^{-5n}}{5n}-\frac{2ab^7x^{-4n}}{n}-\frac{b^8x^{-3n}}{3n} & \text{for } n \\ (a+b)^8\log(x) & \text{other} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.37 Problem number 2587

$$\int x^{-1-12n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^9\,x^{-12n}}{12an}+\frac{b(a+b\,x^n)^9\,x^{-11n}}{44a^2n}-\frac{b^2(a+b\,x^n)^9\,x^{-10n}}{220a^3n}+\frac{b^3(a+b\,x^n)^9\,x^{-9n}}{1980a^4n}$$

command

```
integrate(x**(-1-12*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-12n}}{12n}-\frac{8a^7bx^{-11n}}{11n}-\frac{14a^6b^2x^{-10n}}{5n}-\frac{56a^5b^3x^{-9n}}{9n}-\frac{35a^4b^4x^{-8n}}{4n}-\frac{8a^3b^5x^{-7n}}{n}-\frac{14a^2b^6x^{-6n}}{3n}-\frac{8ab^7x^{-5n}}{5n}-\frac{b^8x^{-4n}}{4n} & \text{for } n \\ (a+b)^8\log{(x)} & \text{other} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.38 Problem number 2588

$$\int x^{-1-13n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^9\,x^{-13n}}{13an}+\frac{b(a+b\,x^n)^9\,x^{-12n}}{39a^2n}-\frac{b^2(a+b\,x^n)^9\,x^{-11n}}{143a^3n}+\frac{b^3(a+b\,x^n)^9\,x^{-10n}}{715a^4n}-\frac{b^4(a+b\,x^n)^9\,x^{-9n}}{6435a^5n}$$

command

```
integrate(x**(-1-13*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-13n}}{13n}-\frac{2a^7bx^{-12n}}{3n}-\frac{28a^6b^2x^{-11n}}{11n}-\frac{28a^5b^3x^{-10n}}{5n}-\frac{70a^4b^4x^{-9n}}{9n}-\frac{7a^3b^5x^{-8n}}{n}-\frac{4a^2b^6x^{-7n}}{n}-\frac{4ab^7x^{-6n}}{3n}-\frac{b^8x^{-5n}}{5n} & \text{for } n \\ (a+b)^8\log{(x)} & \text{other} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.39 Problem number 2589

$$\int x^{-1-14n}(a+bx^n)^8 \, dx$$

Optimal antiderivative

$$-\frac{a^8x^{-14n}}{14n}-\frac{8a^7b\,x^{-13n}}{13n}-\frac{7a^6b^2x^{-12n}}{3n}-\frac{56a^5b^3x^{-11n}}{11n}-\frac{7a^4b^4x^{-10n}}{n}-\frac{56a^3b^5x^{-9n}}{9n}-\frac{7a^2b^6x^{-8n}}{2n}-\frac{8a\,b^7x^{-7n}}{7n}-\frac{b^8x^{-6n}}{6n}$$

command

```
integrate(x**(-1-14*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-14n}}{14n}-\frac{8a^7bx^{-13n}}{13n}-\frac{7a^6b^2x^{-12n}}{3n}-\frac{56a^5b^3x^{-11n}}{11n}-\frac{7a^4b^4x^{-10n}}{n}-\frac{56a^3b^5x^{-9n}}{9n}-\frac{7a^2b^6x^{-8n}}{2n}-\frac{8ab^7x^{-7n}}{7n}-\frac{b^8x^{-6n}}{6n} & \text{for } n \\ (a+b)^8\log(x) & \text{other} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.40 Problem number 2590

$$\int x^{-1-15n}(a+bx^n)^8 \, dx$$

Optimal antiderivative

$$-\frac{a^8x^{-15n}}{15n}-\frac{4a^7b\,x^{-14n}}{7n}-\frac{28a^6b^2x^{-13n}}{13n}-\frac{14a^5b^3x^{-12n}}{3n}-\frac{70a^4b^4x^{-11n}}{11n}-\frac{28a^3b^5x^{-10n}}{5n}-\frac{28a^2b^6x^{-9n}}{9n}-\frac{a\,b^7x^{-8n}}{n}-\frac{b^8x^{-7n}}{7n}$$

command

```
integrate(x**(-1-15*n)*(a+b*x**n)**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-15n}}{15n}-\frac{4a^7bx^{-14n}}{7n}-\frac{28a^6b^2x^{-13n}}{13n}-\frac{14a^5b^3x^{-12n}}{3n}-\frac{70a^4b^4x^{-11n}}{11n}-\frac{28a^3b^5x^{-10n}}{5n}-\frac{28a^2b^6x^{-9n}}{9n}-\frac{ab^7x^{-8n}}{n}-\frac{b^8x^{-7n}}{7n} & \text{fo} \\ (a+b)^8\log(x) & \text{ot} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.41 Problem number 2591

$$\int x^{-1+n}(a+bx^n)^{16}\,dx$$

Optimal antiderivative

$$\frac{(a+b\,x^n)^{17}}{17bn}$$

command

`integrate(x**(-1+n)*(a+b*x**n)**16,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a^{16}x^n}{n}+\frac{8a^{15}bx^{2n}}{n}+\frac{40a^{14}b^2x^{3n}}{n}+\frac{140a^{13}b^3x^{4n}}{n}+\frac{364a^{12}b^4x^{5n}}{n}+\frac{728a^{11}b^5x^{6n}}{n}+\frac{1144a^{10}b^6x^{7n}}{n}+\frac{1430a^9b^7x^{8n}}{n}+\frac{1430a^8b^8x^{9n}}{n}+ \\ (a+b)^{16}\log(x) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.42 Problem number 2605

$$\int \frac{x^{-1-3n}}{a+bx^n}\,dx$$

Optimal antiderivative

$$-\frac{x^{-3n}}{3an}+\frac{b\,x^{-2n}}{2a^2n}-\frac{b^2x^{-n}}{a^3n}-\frac{b^3\ln(x)}{a^4}+\frac{b^3\ln(a+b\,x^n)}{a^4n}$$

command

`integrate(x**(-1-3*n)/(a+b*x**n),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\log(x) & \text{for } a=0 \wedge b=0 \wedge n=0 \\ -\frac{x^{-4n}}{4bn} & \text{for } a=0 \\ \frac{\log(x)}{a+b} & \text{for } n=0 \\ -\frac{x^{-3n}}{3an} & \text{for } b=0 \\ -\frac{x^{-3n}}{3an}+\frac{bx^{-2n}}{2a^2n}-\frac{b^2x^{-n}}{a^3n}-\frac{b^3\log(x^n)}{a^4n}+\frac{b^3\log\left(\frac{a}{b}+x^n\right)}{a^4n} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.43 Problem number 2614

$$\int \frac{x^{-4-3(-1+n)}}{a+bx^n}\,dx$$

Optimal antiderivative

$$-\frac{x^{-3n}}{3an}+\frac{b\,x^{-2n}}{2a^2n}-\frac{b^2x^{-n}}{a^3n}-\frac{b^3\ln(x)}{a^4}+\frac{b^3\ln(a+b\,x^n)}{a^4n}$$

command

```
integrate(x**(-1-3*n)/(a+b*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\log(x) & \text{for } a=0 \wedge b=0 \wedge n=0 \\ -\frac{x^{-4n}}{4bn} & \text{for } a=0 \\ \frac{\log(x)}{a+b} & \text{for } n=0 \\ -\frac{x^{-3n}}{3an} & \text{for } b=0 \\ -\frac{x^{-3n}}{3an}+\frac{bx^{-2n}}{2a^2n}-\frac{b^2x^{-n}}{a^3n}-\frac{b^3\log(x^n)}{a^4n}+\frac{b^3\log\left(\frac{a}{b}+x^n\right)}{a^4n} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.44 Problem number 2623

$$\int \frac{x^{-1-3n}}{2+bx^n}\,dx$$

Optimal antiderivative

$$-\frac{x^{-3n}}{6n}+\frac{b\,x^{-2n}}{8n}-\frac{b^2x^{-n}}{8n}-\frac{b^3\ln(x)}{16}+\frac{b^3\ln(2+b\,x^n)}{16n}$$

command

```
integrate(x**(-1-3*n)/(2+b*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\log(x)}{2} & \text{for } b = 0 \wedge n = 0 \\ \frac{\log(x)}{b+2} & \text{for } n = 0 \\ -\frac{x^{-3n}}{6n} & \text{for } b = 0 \\ -\frac{b^3 \log(x^n)}{16n} + \frac{b^3 \log\left(x^n + \frac{2}{b}\right)}{16n} - \frac{b^2 x^{-n}}{8n} + \frac{bx^{-2n}}{8n} - \frac{x^{-3n}}{6n} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.45 Problem number 2624

$$\int \frac{x^{-1+4n}}{(a+bx^n)^2}\,dx$$

Optimal antiderivative

$$-\frac{2a\,x^n}{b^3n} + \frac{x^{2n}}{2b^2n} + \frac{a^3}{b^4n\,(a+b\,x^n)} + \frac{3a^2 \ln(a+b\,x^n)}{b^4n}$$

command

```
integrate(x**(-1+4*n)/(a+b*x**n)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\log(x)}{a^2} & \text{for } b = 0 \wedge n = 0 \\ \frac{x^{4n}}{4a^2n} & \text{for } b = 0 \\ \frac{\log(x)}{(a+b)^2} & \text{for } n = 0 \\ \frac{6a^3 \log\left(\frac{a}{b} + x^n\right)}{2ab^4n + 2b^5nx^n} + \frac{6a^3}{2ab^4n + 2b^5nx^n} + \frac{6a^2bx^n \log\left(\frac{a}{b} + x^n\right)}{2ab^4n + 2b^5nx^n} - \frac{3ab^2x^{2n}}{2ab^4n + 2b^5nx^n} + \frac{b^3x^{3n}}{2ab^4n + 2b^5nx^n} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: HeuristicGCDFailed

15.46 Problem number 2630

$$\int \frac{x^{-1-2n}}{(a+bx^n)^2}\,dx$$

Optimal antiderivative

$$-\frac{x^{-2n}}{2a^2n}+\frac{2b\,x^{-n}}{a^3n}+\frac{b^2}{a^3n\,(a+b\,x^n)}+\frac{3b^2\ln(x)}{a^4}-\frac{3b^2\ln(a+b\,x^n)}{a^4n}$$

command

```
integrate(x**(-1-2*n)/(a+b*x**n)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\log(x) \\ -\frac{x^{-2n}}{2a^2n} \\ -\frac{x^{-4n}}{4b^2n} \\ \frac{\tilde{\infty}x^{-2n}}{n} \\ \frac{\log(x)}{(a+b)^2} \\ -\frac{a^3}{2a^5nx^{2n}+2a^4bnx^{3n}}+\frac{3a^2bx^n}{2a^5nx^{2n}+2a^4bnx^{3n}}+\frac{6ab^2x^{2n}\log(x^n)}{2a^5nx^{2n}+2a^4bnx^{3n}}-\frac{6ab^2x^{2n}\log\left(\frac{a}{b}+x^n\right)}{2a^5nx^{2n}+2a^4bnx^{3n}}+\frac{6ab^2x^{2n}}{2a^5nx^{2n}+2a^4bnx^{3n}}+\frac{6b^3x^{3n}\log(x^n)}{2a^5nx^{2n}+2a^4bnx^{3}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.47 Problem number 2639

$$\int \frac{x^{-1-\frac{n}{2}}}{a+bx^n}\,dx$$

Optimal antiderivative

$$-\frac{2x^{-\frac{n}{2}}}{an}+\frac{2\arctan\left(\frac{\sqrt{a}\,x^{-\frac{n}{2}}}{\sqrt{b}}\right)\sqrt{b}}{a^{\frac{3}{2}}n}$$

command

```
integrate(x**(-1-1/2*n)/(a+b*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\log(x) & \text{for } a=0 \wedge b=0 \wedge n=0 \\ -\frac{2x^{-\frac{3n}{2}}}{3bn} & \text{for } a=0 \\ \frac{\log(x)}{a+b} & \text{for } n=0 \\ -\frac{2x^{-\frac{n}{2}}}{an} & \text{for } b=0 \\ -\frac{2x^{-\frac{n}{2}}}{an} + \frac{b\log\left(-\sqrt{-\frac{b}{a}}+x^{-\frac{n}{2}}\right)}{a^2n\sqrt{-\frac{b}{a}}} - \frac{b\log\left(\sqrt{-\frac{b}{a}}+x^{-\frac{n}{2}}\right)}{a^2n\sqrt{-\frac{b}{a}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.48 Problem number 2643

$$\int \frac{x^{-1-\frac{n}{2}}}{a+bx^n}\,dx$$

Optimal antiderivative

$$-\frac{2x^{-\frac{n}{2}}}{an} + \frac{2\arctan\left(\frac{\sqrt{a}\,x^{-\frac{n}{2}}}{\sqrt{b}}\right)\sqrt{b}}{a^{\frac{3}{2}}n}$$

command

```
integrate(x**(-1-1/2*n)/(a+b*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\log(x) & \text{for } a=0 \wedge b=0 \wedge n=0 \\ -\frac{2x^{-\frac{3n}{2}}}{3bn} & \text{for } a=0 \\ \frac{\log(x)}{a+b} & \text{for } n=0 \\ -\frac{2x^{-\frac{n}{2}}}{an} & \text{for } b=0 \\ -\frac{2x^{-\frac{n}{2}}}{an} + \frac{b\log\left(-\sqrt{-\frac{b}{a}}+x^{-\frac{n}{2}}\right)}{a^2n\sqrt{-\frac{b}{a}}} - \frac{b\log\left(\sqrt{-\frac{b}{a}}+x^{-\frac{n}{2}}\right)}{a^2n\sqrt{-\frac{b}{a}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.49 Problem number 2667

$$\int x^m(a+bx^n)^3\,dx$$

Optimal antiderivative

$$\frac{a^3x^{1+m}}{1+m}+\frac{3a^2b\,x^{1+m+n}}{1+m+n}+\frac{3a\,b^2x^{1+m+2n}}{1+m+2n}+\frac{b^3x^{1+m+3n}}{1+m+3n}$$

command

`integrate(x**m*(a+b*x**n)**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

15.50 Problem number 2725

$$\int x^{-1-9n}(a+bx^n)^8\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^9\,x^{-9n}}{9an}$$

command

`integrate(x**(-1-9*n)*(a+b*x**n)**8,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^8x^{-9n}}{9n}-\frac{a^7bx^{-8n}}{n}-\frac{4a^6b^2x^{-7n}}{n}-\frac{28a^5b^3x^{-6n}}{3n}-\frac{14a^4b^4x^{-5n}}{n}-\frac{14a^3b^5x^{-4n}}{n}-\frac{28a^2b^6x^{-3n}}{3n}-\frac{4ab^7x^{-2n}}{n}-\frac{b^8x^{-n}}{n} & \text{for } n\neq 0 \\ (a+b)^8\log(x) & \text{otherwis} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.51 Problem number 2740

$$\int x^m \left(a+bx^{2+2m}\right)^3 \, dx$$

Optimal antiderivative

$$\frac{a^3x^{1+m}}{1+m}+\frac{a^2b\,x^{3+3m}}{1+m}+\frac{3a\,b^2x^{5+5m}}{5\,(1+m)}+\frac{b^3x^{7+7m}}{7+7m}$$

command

```
integrate(x**m*(a+b*x**(2+2*m))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{35a^3xx^m}{35m+35}+\frac{35a^2bx^3x^{3m}}{35m+35}+\frac{21ab^2x^5x^{5m}}{35m+35}+\frac{5b^3x^7x^{7m}}{35m+35} & \text{for } m\neq -1 \\ (a+b)^3\log{(x)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.52 Problem number 2798

$$\int (cx)^{-1-n-np}\,(a+bx^n)^p \, dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^{1+p}\,(cx)^{-n(1+p)}}{acn\,(1+p)}$$

command

```
integrate((c*x)**(-n*p-n-1)*(a+b*x**n)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{b^pc^{-n}c^{-np}x^{-n}\left(\frac{ax^{-n}}{b}+1\right)^p\Gamma(-p-1)}{cn\Gamma\left(-p\right)}+\frac{bb^pc^{-n}c^{-np}\left(\frac{ax^{-n}}{b}+1\right)^p\Gamma(-p-1)}{acn\Gamma\left(-p\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.53 Problem number 2799

$$\int (cx)^{-1-2n-np}(a+bx^n)^p\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^{1+p}\,(cx)^{-n(2+p)}}{acn\,(1+p)}+\frac{(a+b\,x^n)^{2+p}\,(cx)^{-n(2+p)}}{a^2cn\,(1+p)\,(2+p)}$$

command

```
integrate((c*x)**(-n*p-2*n-1)*(a+b*x**n)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{b^pc^{-2n}c^{-np}px^{-2n}\left(\frac{ax^{-n}}{b}+1\right)^p\Gamma(-p-2)}{cn\Gamma\left(-p\right)}-\frac{b^pc^{-2n}c^{-np}x^{-2n}\left(\frac{ax^{-n}}{b}+1\right)^p\Gamma(-p-2)}{cn\Gamma\left(-p\right)}-\frac{bb^pc^{-2n}c^{-np}px^{-n}\left(\frac{ax^{-n}}{b}+1\right)^p\Gamma(-p-2)}{acn\Gamma\left(-p\right)}+\frac{b^2b^pc^{-2n}c^{-np}\left(\frac{ax^{-n}}{b}+1\right)^p\Gamma(-p-2)}{a^2cn\Gamma\left(-p\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.54 Problem number 2800

$$\int (cx)^{-1-3n-np}(a+bx^n)^p\,dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^{1+p}\,(cx)^{-n(3+p)}}{acn\,(1+p)}+\frac{2(a+b\,x^n)^{2+p}\,(cx)^{-n(3+p)}}{a^2cn\,(1+p)\,(2+p)}-\frac{2(a+b\,x^n)^{3+p}\,(cx)^{-n(3+p)}}{a^3cn\,(1+p)\,(2+p)\,(3+p)}$$

command

```
integrate((c*x)**(-n*p-3*n-1)*(a+b*x**n)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

15.55 Problem number 2801

$$\int (cx)^{-1-4n-np} (a+bx^n)^p \, dx$$

Optimal antiderivative

$$-\frac{(a+b\,x^n)^{1+p}\,(cx)^{-n(4+p)}}{acn\,(1+p)}+\frac{3(a+b\,x^n)^{2+p}\,(cx)^{-n(4+p)}}{a^2cn\,(1+p)\,(2+p)} -\frac{6(a+b\,x^n)^{3+p}\,(cx)^{-n(4+p)}}{a^3cn\,(1+p)\,(2+p)\,(3+p)}+\frac{6(a+b\,x^n)^{4+p}\,(cx)^{-n(4+p)}}{a^4cn\,(p^2+3p+2)\,(p^2+7p+12)}$$

command

```
integrate((c*x)**(-n*p-4*n-1)*(a+b*x**n)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

15.56 Problem number 2851

$$\int (c+dx)\left(a+b(c+dx)^2\right)^p \, dx$$

Optimal antiderivative

$$\frac{\left(a+b(dx+c)^2\right)^{1+p}}{2bd\,(1+p)}$$

command

```
integrate((d*x+c)*(a+b*(d*x+c)**2)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{cx}{a} & \text{for } b=0 \wedge \\ a^p\left(cx+\frac{dx^2}{2}\right) & \text{for } b=0 \\ cx\left(a+bc^2\right)^p & \text{for } d=0 \\ \frac{\log\left(\frac{c}{d}+x-\frac{\sqrt{-ab}}{bd}\right)}{2bd}+\frac{\log\left(\frac{c}{d}+x+\frac{\sqrt{-ab}}{bd}\right)}{2bd} & \text{for } p=-1 \\ \frac{a(a+bc^2+2bcdx+bd^2x^2)^p}{2bdp+2bd}+\frac{bc^2(a+bc^2+2bcdx+bd^2x^2)^p}{2bdp+2bd}+\frac{2bcdx(a+bc^2+2bcdx+bd^2x^2)^p}{2bdp+2bd}+\frac{bd^2x^2(a+bc^2+2bcdx+bd^2x^2)^p}{2bdp+2bd} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.57 Problem number 3017

$$\int \frac{1}{x\left(a+b\left(cx^n\right)^{\frac{1}{n}}\right)^2}\,dx$$

Optimal antiderivative

$$\frac{1}{a\left(a+b\left(c\,x^n\right)^{\frac{1}{n}}\right)}+\frac{\ln\left(x\right)}{a^2}-\frac{\ln\left(a+b(c\,x^n)^{\frac{1}{n}}\right)}{a^2}$$

command

```
integrate(1/x/(a+b*(c*x**n)**(1/n))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}(cx^n)^{-\frac{2}{n}} & \text{for } a=0\wedge b=0 \\ \frac{\log(x)}{a^2} & \text{for } b=0 \\ -\frac{(cx^n)^{-\frac{2}{n}}}{2b^2} & \text{for } a=0 \\ \tilde{\infty}\log(x) & \text{for } b=-a(cx^n)^{-\frac{1}{n}} \\ \frac{a\log(x)}{a^3+a^2b(cx^n)^{\frac{1}{n}}}-\frac{a\log\left(\frac{a}{b}+(cx^n)^{\frac{1}{n}}\right)}{a^3+a^2b(cx^n)^{\frac{1}{n}}}+\frac{a}{a^3+a^2b(cx^n)^{\frac{1}{n}}}+\frac{b(cx^n)^{\frac{1}{n}}\log(x)}{a^3+a^2b(cx^n)^{\frac{1}{n}}}-\frac{b(cx^n)^{\frac{1}{n}}\log\left(\frac{a}{b}+(cx^n)^{\frac{1}{n}}\right)}{a^3+a^2b(cx^n)^{\frac{1}{n}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.58 Problem number 3020

$$\int \frac{1}{\left(a+b\left(cx^n\right)^{\frac{1}{n}}\right)^3}\,dx$$

Optimal antiderivative

$$-\frac{x(c\,x^n)^{-\frac{1}{n}}}{2b\left(a+b\left(c\,x^n\right)^{\frac{1}{n}}\right)^2}$$

command

```
integrate(1/(a+b*(c*x**n)**(1/n))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2ax}{2a^4+4a^3b(cx^n)^{\frac{1}{n}}+2a^2b^2(cx^n)^{\frac{2}{n}}} + \frac{bx(cx^n)^{\frac{1}{n}}}{2a^4+4a^3b(cx^n)^{\frac{1}{n}}+2a^2b^2(cx^n)^{\frac{2}{n}}} & \text{for } a \neq 0 \\ -\frac{x(cx^n)^{-\frac{3}{n}}}{2b^3} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.59 Problem number 3077

$$\int \frac{(cx^n)^{\frac{1}{n}}}{\left(a+b\,(cx^n)^{\frac{1}{n}}\right)^4}\,dx$$

Optimal antiderivative

$$\frac{ax(c\,x^n)^{-\frac{1}{n}}}{3b^2\left(a+b\,(c\,x^n)^{\frac{1}{n}}\right)^3} - \frac{x(c\,x^n)^{-\frac{1}{n}}}{2b^2\left(a+b\,(c\,x^n)^{\frac{1}{n}}\right)^2}$$

command

```
integrate((c*x**n)**(1/n)/(a+b*(c*x**n)**(1/n))**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{3ax(cx^n)^{\frac{1}{n}}}{6a^5+18a^4b(cx^n)^{\frac{1}{n}}+18a^3b^2(cx^n)^{\frac{2}{n}}+6a^2b^3(cx^n)^{\frac{3}{n}}} + \frac{bx(cx^n)^{\frac{2}{n}}}{6a^5+18a^4b(cx^n)^{\frac{1}{n}}+18a^3b^2(cx^n)^{\frac{2}{n}}+6a^2b^3(cx^n)^{\frac{3}{n}}} & \text{for } a \neq 0 \\ -\frac{x(cx^n)^{-\frac{3}{n}}}{2b^4} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

15.60 Problem number 3078

$$\int \frac{(cx^n)^{\frac{1}{n}}}{\left(a+b\left(cx^n\right)^{\frac{1}{n}}\right)^5}\,dx$$

Optimal antiderivative

$$\frac{ax(c\,x^n)^{-\frac{1}{n}}}{4b^2\left(a+b\left(c\,x^n\right)^{\frac{1}{n}}\right)^4}-\frac{x(c\,x^n)^{-\frac{1}{n}}}{3b^2\left(a+b\left(c\,x^n\right)^{\frac{1}{n}}\right)^3}$$

command

```
integrate((c*x**n)**(1/n)/(a+b*(c*x**n)**(1/n))**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{6a^2x(cx^n)^{\frac{1}{n}}}{12a^7+48a^6b(cx^n)^{\frac{1}{n}}+72a^5b^2(cx^n)^{\frac{2}{n}}+48a^4b^3(cx^n)^{\frac{3}{n}}+12a^3b^4(cx^n)^{\frac{4}{n}}}+\frac{4abx(cx^n)^{\frac{2}{n}}}{12a^7+48a^6b(cx^n)^{\frac{1}{n}}+72a^5b^2(cx^n)^{\frac{2}{n}}+48a^4b^3(cx^n)^{\frac{3}{n}}+12a^3b^4(cx^n)^{\frac{4}{n}}}- \\ -\frac{x(cx^n)^{-\frac{4}{n}}}{3b^5}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

16 Test file number 26

Test folder name:

test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.3_General/26_1.1.3.3-a+b_x^n-^p-c+d_x^n-^q

16.1 Problem number 31

$$\int \frac{a-bx^3}{(a+bx^3)^{10/3}}\,dx$$

Optimal antiderivative

$$\frac{2x}{7\left(b\,x^3+a\right)^{\frac{7}{3}}}+\frac{5x}{28a\left(b\,x^3+a\right)^{\frac{4}{3}}}+\frac{15x}{28a^2\left(b\,x^3+a\right)^{\frac{1}{3}}}$$

command

```
integrate((-b*x**3+a)/(b*x**3+a)**(10/3),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$a\left(\frac{28a^5x\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}\right.$$
$$+\frac{70a^4bx^4\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}$$
$$+\frac{60a^3b^2x^7\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}$$
$$+\frac{18a^2b^3x^{10}\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}$$
$$-b\left(\frac{7ax^4\Gamma\left(\frac{4}{3}\right)}{9a^{\frac{13}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+18a^{\frac{10}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+9a^{\frac{7}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}\right.$$
$$\left.+\frac{3bx^7\Gamma\left(\frac{4}{3}\right)}{9a^{\frac{13}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+18a^{\frac{10}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+9a^{\frac{7}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

16.2 Problem number 61

$$\int\frac{c+dx^3}{\left(a+bx^3\right)^{10/3}}\,dx$$

Optimal antiderivative

$$\frac{(-ad+bc)\,x}{7ab\,(b\,x^3+a)^{\frac{7}{3}}}+\frac{(ad+6bc)\,x}{28a^2b\,(b\,x^3+a)^{\frac{4}{3}}}+\frac{3(ad+6bc)\,x}{28a^3b\,(b\,x^3+a)^{\frac{1}{3}}}$$

command

```
integrate((d*x**3+c)/(b*x**3+a)**(10/3),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$c\left(\frac{28a^5x\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\right.}\right.$$
$$+\frac{70a^4bx^4\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right.}$$
$$+\frac{60a^3b^2x^7\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right.}$$
$$+\frac{18a^2b^3x^{10}\Gamma\left(\frac{1}{3}\right)}{27a^{\frac{25}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{22}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+81a^{\frac{19}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+27a^{\frac{16}{3}}b^3x^9\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right.}$$
$$+d\left(\frac{7ax^4\Gamma\left(\frac{4}{3}\right)}{9a^{\frac{13}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+18a^{\frac{10}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+9a^{\frac{7}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}\right.$$
$$\left.+\frac{3bx^7\Gamma\left(\frac{4}{3}\right)}{9a^{\frac{13}{3}}\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+18a^{\frac{10}{3}}bx^3\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)+9a^{\frac{7}{3}}b^2x^6\sqrt[3]{1+\frac{bx^3}{a}}\,\Gamma\left(\frac{10}{3}\right)}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

16.3 Problem number 134

$$\int \left(a+bx^3\right)^2\left(c+dx^3\right)^q\,dx$$

Optimal antiderivative

$$-\frac{b(4bc-ad(10+3q))\,x\left(d\,x^3+c\right)^{1+q}}{d^2\left(9q^2+33q+28\right)}+\frac{bx\left(b\,x^3+a\right)\left(d\,x^3+c\right)^{1+q}}{d\left(7+3q\right)}$$
$$+\frac{\left(4b^2c^2-2abcd(7+3q)+a^2d^2\left(9q^2+33q+28\right)\right)x\left(d\,x^3+c\right)^{1+q}\,\text{hypergeom}\left(\left[1,\frac{4}{3}+q\right],\left[\frac{4}{3}\right],-\frac{d\,x^3}{c}\right)}{c\,d^2\left(9q^2+33q+28\right)}$$

command

```
integrate((b*x**3+a)**2*(d*x**3+c)**q,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^{2}c^{q}x\Gamma\left(\frac{1}{3}\right){}_{2}F_{1}\left(\begin{matrix}\frac{1}{3},-q\\\frac{4}{3}\end{matrix}\middle|\frac{dx^{3}e^{i\pi}}{c}\right)}{3\Gamma\left(\frac{4}{3}\right)}+\frac{2abc^{q}x^{4}\Gamma\left(\frac{4}{3}\right){}_{2}F_{1}\left(\begin{matrix}\frac{4}{3},-q\\\frac{7}{3}\end{matrix}\middle|\frac{dx^{3}e^{i\pi}}{c}\right)}{3\Gamma\left(\frac{7}{3}\right)}+\frac{b^{2}c^{q}x^{7}\Gamma\left(\frac{7}{3}\right){}_{2}F_{1}\left(\begin{matrix}\frac{7}{3},-q\\\frac{10}{3}\end{matrix}\middle|\frac{dx^{3}e^{i\pi}}{c}\right)}{3\Gamma\left(\frac{10}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

16.4 Problem number 139

$$\int \left(a+bx^{3}\right)^{m}\left(c+dx^{3}\right)^{2}\,dx$$

Optimal antiderivative

$$-\frac{d(4ad-bc(10+3m))\,x\left(b\,x^{3}+a\right)^{1+m}}{b^{2}\left(9m^{2}+33m+28\right)}+\frac{dx\left(b\,x^{3}+a\right)^{1+m}\left(d\,x^{3}+c\right)}{b\,(7+3m)}$$
$$+\frac{\left(4a^{2}d^{2}-2abcd(7+3m)+b^{2}c^{2}\left(9m^{2}+33m+28\right)\right)x\left(b\,x^{3}+a\right)^{m}\operatorname{hypergeom}\left(\left[\frac{1}{3},-m\right],\left[\frac{4}{3}\right],-\frac{b\,x^{3}}{a}\right)\left(1+\frac{b\,x^{3}}{a}\right)^{-m}}{b^{2}\left(9m^{2}+33m+28\right)}$$

command

```
integrate((b*x**3+a)**m*(d*x**3+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^{m}c^{2}x\Gamma\left(\frac{1}{3}\right){}_{2}F_{1}\left(\begin{matrix}\frac{1}{3},-m\\\frac{4}{3}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{4}{3}\right)}+\frac{2a^{m}cdx^{4}\Gamma\left(\frac{4}{3}\right){}_{2}F_{1}\left(\begin{matrix}\frac{4}{3},-m\\\frac{7}{3}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{7}{3}\right)}$$
$$+\frac{a^{m}d^{2}x^{7}\Gamma\left(\frac{7}{3}\right){}_{2}F_{1}\left(\begin{matrix}\frac{7}{3},-m\\\frac{10}{3}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{10}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

16.5 Problem number 291

$$\int \frac{a+bx^n}{(c+dx^n)^4}\,dx$$

Optimal antiderivative

$$-\frac{(-ad+bc)\,x}{3cdn\,(c+d\,x^n)^3}+\frac{(bc-ad(1-3n))\,x\,\text{hypergeom}\left(\left[3,\frac{1}{n}\right],\left[1+\frac{1}{n}\right],-\frac{d\,x^n}{c}\right)}{3c^4dn}$$

command

```
integrate((a+b*x**n)/(c+d*x**n)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

16.6 Problem number 292

$$\int (a+bx^n)^2\,(d+ex^n)^3\,dx$$

Optimal antiderivative

$$a^2d^3x+\frac{a\,d^2(3ae+2bd)\,x^{1+n}}{1+n}+\frac{d\left(3a^2e^2+6abde+b^2d^2\right)x^{1+2n}}{1+2n}+\frac{e\left(a^2e^2+6abde+3b^2d^2\right)x^{1+3n}}{1+3n}+\frac{b\,e^2(2ae+3bd)\,x^{1+4n}}{1+4n}+\frac{b^2e^3x^{1+5n}}{1+5n}$$

command

```
integrate((a+b*x**n)**2*(d+e*x**n)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

17 Test file number 27

Test folder name:

`test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.3_General/27_1.1.3.4-e_x-^m-a+b_x^n-^p-c+d_x^n-^q`

17.1 Problem number 128

$$\int \frac{x^m (A + Bx^3)}{(a + bx^3)^2}\,dx$$

Optimal antiderivative

$$\frac{(Ab - Ba)\,x^{1+m}}{3ab\,(b\,x^3 + a)} + \frac{(Ab(2-m) + aB(1+m))\,x^{1+m}\,\mathrm{hypergeom}\left(\left[1, \frac{1}{3} + \frac{m}{3}\right], \left[\frac{4}{3} + \frac{m}{3}\right], -\frac{b\,x^3}{a}\right)}{3a^2b\,(1+m)}$$

command

```
integrate(x**m*(B*x**3+A)/(b*x**3+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

17.2 Problem number 155

$$\int \frac{x^{7/2} (A + Bx^3)}{a + bx^3}\,dx$$

Optimal antiderivative

$$\frac{2(Ab - Ba)\,x^{\frac{3}{2}}}{3b^2} + \frac{2B\,x^{\frac{9}{2}}}{9b} - \frac{2(Ab - Ba)\arctan\left(\frac{x^{\frac{3}{2}}\sqrt{b}}{\sqrt{a}}\right)\sqrt{a}}{3b^{\frac{5}{2}}}$$

command

```
integrate(x**(7/2)*(B*x**3+A)/(b*x**3+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(\frac{2Ax^{\frac{3}{2}}}{3}+\frac{2Bx^{\frac{9}{2}}}{9}\right) \\ \frac{\frac{2Ax^{\frac{9}{2}}}{9}+\frac{2Bx^{\frac{15}{2}}}{15}}{a} \\ \frac{\frac{2Ax^{\frac{3}{2}}}{3}+\frac{2Bx^{\frac{9}{2}}}{9}}{b} \\ -\frac{Aa\log\left(\sqrt{x}-\sqrt[6]{-\frac{a}{b}}\right)}{3b^2\sqrt{-\frac{a}{b}}}+\frac{Aa\log\left(\sqrt{x}+\sqrt[6]{-\frac{a}{b}}\right)}{3b^2\sqrt{-\frac{a}{b}}}+\frac{Aa\log\left(-4\sqrt{x}\sqrt[6]{-\frac{a}{b}}+4x+4\sqrt[3]{-\frac{a}{b}}\right)}{3b^2\sqrt{-\frac{a}{b}}}-\frac{Aa\log\left(4\sqrt{x}\sqrt[6]{-\frac{a}{b}}+4x+4\sqrt[3]{-\right.}{3b^2\sqrt{-\frac{a}{b}}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.3 Problem number 162

$$\int \frac{A+Bx^3}{x^{7/2}(a+bx^3)}\,dx$$

Optimal antiderivative

$$-\frac{2A}{5a\,x^{\frac{5}{2}}}-\frac{2(Ab-Ba)\arctan\left(\frac{b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{3a^{\frac{11}{6}}b^{\frac{1}{6}}}-\frac{(Ab-Ba)\arctan\left(-\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{3a^{\frac{11}{6}}b^{\frac{1}{6}}}-\frac{(Ab-Ba)\arctan\left(\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{3a^{\frac{11}{6}}b^{\frac{1}{6}}}+\frac{(Ab-Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x-a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{6a^{\frac{11}{6}}b^{\frac{1}{6}}}-\frac{(Ab-Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x+a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{6a^{\frac{11}{6}}b^{\frac{1}{6}}}$$

command

```
integrate((B*x**3+A)/x**(7/2)/(b*x**3+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{5x^{\frac{5}{2}}}\right) \\ \frac{-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{5x^{\frac{5}{2}}}}{b} \\ \frac{-\frac{2A}{5x^{\frac{5}{2}}}+2B\sqrt{x}}{a} \\ -\frac{2A}{5ax^{\frac{5}{2}}}+\frac{Ab\sqrt[6]{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[6]{-\frac{a}{b}}\right)}{3a^2}-\frac{Ab\sqrt[6]{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[6]{-\frac{a}{b}}\right)}{3a^2}+\frac{Ab\sqrt[6]{-\frac{a}{b}}\log\left(-4\sqrt{x}\sqrt[6]{-\frac{a}{b}}+4x+4\sqrt[3]{-\frac{a}{b}}\right)}{6a^2}-A \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.4 Problem number 164

$$\int \frac{x^{5/2}(A+Bx^3)}{(a+bx^3)^2}\,dx$$

Optimal antiderivative

$$\frac{(Ab-Ba)\,x^{\frac{7}{2}}}{3ab\,(b\,x^3+a)}+\frac{(Ab-7Ba)\arctan\left(\frac{b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{9a^{\frac{5}{6}}b^{\frac{13}{6}}}+\frac{(Ab-7Ba)\arctan\left(-\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{5}{6}}b^{\frac{13}{6}}}+\frac{(Ab-7Ba)\arctan\left(\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{5}{6}}b^{\frac{13}{6}}}-\frac{(Ab-7Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x-a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{5}{6}}b^{\frac{13}{6}}}+\frac{(Ab-7Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x+a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{5}{6}}b^{\frac{13}{6}}}-\frac{(Ab-7Ba)\sqrt{x}}{3a\,b^2}$$

command

```
integrate(x**(5/2)*(B*x**3+A)/(b*x**3+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

17.5 Problem number 165

$$\int \frac{x^{3/2}(A+Bx^3)}{(a+bx^3)^2}\,dx$$

Optimal antiderivative

$$\frac{(Ab-Ba)\,x^{\frac{5}{2}}}{3ab\,(b\,x^3+a)}+\frac{(Ab+5Ba)\arctan\left(\frac{b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{9a^{\frac{7}{6}}b^{\frac{11}{6}}}+\frac{(Ab+5Ba)\arctan\left(-\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{7}{6}}b^{\frac{11}{6}}}+\frac{(Ab+5Ba)\arctan\left(\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{7}{6}}b^{\frac{11}{6}}}+\frac{(Ab+5Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x-a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{7}{6}}b^{\frac{11}{6}}}-\frac{(Ab+5Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x+a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{7}{6}}b^{\frac{11}{6}}}$$

command

`integrate(x**(3/2)*(B*x**3+A)/(b*x**3+a)**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

17.6 Problem number 166

$$\int \frac{\sqrt{x}\,(A+Bx^3)}{(a+bx^3)^2}\,dx$$

Optimal antiderivative

$$\frac{(Ab-Ba)\,x^{\frac{3}{2}}}{3ab\,(b\,x^3+a)}+\frac{(Ab+Ba)\arctan\left(\frac{x^{\frac{3}{2}}\sqrt{b}}{\sqrt{a}}\right)}{3a^{\frac{3}{2}}b^{\frac{3}{2}}}$$

command

`integrate((B*x**3+A)*x**(1/2)/(b*x**3+a)**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{2A}{9x^{\frac{9}{2}}}-\frac{2B}{3x^{\frac{3}{2}}}\right) \\ \frac{\frac{2Ax^{\frac{3}{2}}}{3}+\frac{2Bx^{\frac{9}{2}}}{9}}{a^2} \\ \frac{-\frac{2A}{9x^{\frac{9}{2}}}-\frac{2B}{3x^{\frac{3}{2}}}}{b^2} \\ \frac{2Aabx^{\frac{3}{2}}}{6a^3b+6a^2b^2x^3}-\frac{Aab\sqrt{-\frac{a}{b}}\log\left(\sqrt{x}-\sqrt[6]{-\frac{a}{b}}\right)}{6a^3b+6a^2b^2x^3}+\frac{Aab\sqrt{-\frac{a}{b}}\log\left(\sqrt{x}+\sqrt[6]{-\frac{a}{b}}\right)}{6a^3b+6a^2b^2x^3}+\frac{Aab\sqrt{-\frac{a}{b}}\log\left(-4\sqrt{x}\sqrt[6]{-\frac{a}{b}}+4x+4\sqrt[3]{-\right.}{6a^3b+6a^2b^2x^3} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.7 Problem number 167

$$\int \frac{A+Bx^3}{\sqrt{x}\,(a+bx^3)^2}\,dx$$

Optimal antiderivative

$$\frac{(5Ab+Ba)\arctan\left(\frac{b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{9a^{\frac{11}{6}}b^{\frac{7}{6}}}+\frac{(5Ab+Ba)\arctan\left(-\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{11}{6}}b^{\frac{7}{6}}}+\frac{(5Ab+Ba)\arctan\left(\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{11}{6}}b^{\frac{7}{6}}}-\frac{(5Ab+Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x-a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{11}{6}}b^{\frac{7}{6}}}+\frac{(5Ab+Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x+a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{11}{6}}b^{\frac{7}{6}}}+\frac{(Ab-Ba)\sqrt{x}}{3ab\,(b\,x^3+a)}$$

command

```
integrate((B*x**3+A)/(b*x**3+a)**2/x**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

17.8 Problem number 168

$$\int \frac{A+Bx^3}{x^{3/2}\,(a+bx^3)^2}\,dx$$

Optimal antiderivative

$$-\frac{(7Ab-Ba)\arctan\left(\frac{b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{9a^{\frac{13}{6}}b^{\frac{5}{6}}}-\frac{(7Ab-Ba)\arctan\left(-\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{13}{6}}b^{\frac{5}{6}}}-\frac{(7Ab-Ba)\arctan\left(\sqrt{3}+\frac{2b^{\frac{1}{6}}\sqrt{x}}{a^{\frac{1}{6}}}\right)}{18a^{\frac{13}{6}}b^{\frac{5}{6}}}-\frac{(7Ab-Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x-a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{13}{6}}b^{\frac{5}{6}}}+\frac{(7Ab-Ba)\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x+a^{\frac{1}{6}}b^{\frac{1}{6}}\sqrt{3}\,\sqrt{x}\right)\sqrt{3}}{36a^{\frac{13}{6}}b^{\frac{5}{6}}}+\frac{-7Ab+Ba}{3a^2b\sqrt{x}}+\frac{Ab-Ba}{3ab\,(b\,x^3+a)\,\sqrt{x}}$$

command

```
integrate((B*x**3+A)/x**(3/2)/(b*x**3+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

17.9 Problem number 248

$$\int \frac{A+Bx^3}{x^4\,(a+bx^3)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{-5Ab+2Ba}{9a^2\,(b\,x^3+a)^{\frac{3}{2}}}-\frac{A}{3a\,x^3\,(b\,x^3+a)^{\frac{3}{2}}}+\frac{(5Ab-2Ba)\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^3+a}}{\sqrt{a}}\right)}{3a^{\frac{7}{2}}}+\frac{-5Ab+2Ba}{3a^3\sqrt{b\,x^3+a}}$$

command

```
integrate((B*x**3+A)/x**4/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

17.10 Problem number 249

$$\int \frac{x^6\,(A+Bx^3)}{(a+bx^3)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2(5Ab-14Ba)\,x^4}{45b^2\,(b\,x^3+a)^{\frac{3}{2}}}+\frac{2B\,x^7}{5b\,(b\,x^3+a)^{\frac{3}{2}}}-\frac{16(5Ab-14Ba)\,x}{135b^3\sqrt{b\,x^3+a}}$$

$$+\frac{32(5Ab-14Ba)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}+\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}{405b^{\frac{10}{3}}\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$

command

```
integrate(x**6*(B*x**3+A)/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A x^{7} \Gamma\left(\frac{7}{3}\right) {}_{2}F_{1}\left(\begin{matrix} \frac{7}{3}, \frac{5}{2} \\ \frac{10}{3} \end{matrix}\middle| {\frac{b x^{3} e^{i \pi}}{a}} \right)}{3 a^{\frac{5}{2}} \Gamma\left(\frac{10}{3}\right)} + \frac{B x^{10} \Gamma\left(\frac{10}{3}\right) {}_{2}F_{1}\left(\begin{matrix} \frac{5}{2}, \frac{10}{3} \\ \frac{13}{3} \end{matrix}\middle| {\frac{b x^{3} e^{i \pi}}{a}} \right)}{3 a^{\frac{5}{2}} \Gamma\left(\frac{13}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.11 Problem number 252

$$\int \frac{A + Bx^3}{x^3 \left(a + bx^3\right)^{5/2}}\, dx$$

Optimal antiderivative

$$-\frac{A}{2a\,x^{2}\left(b\,x^{3}+a\right)^{\frac{3}{2}}}-\frac{\left(13Ab-4Ba\right)x}{18a^{2}\left(b\,x^{3}+a\right)^{\frac{3}{2}}}-\frac{7\left(13Ab-4Ba\right)x}{54a^{3}\sqrt{b\,x^{3}+a}}$$
$$-\frac{7\left(13Ab-4Ba\right)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\operatorname{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}+\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^{2}}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}}{162a^{3}b^{\frac{1}{3}}\sqrt{b\,x^{3}+a}\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}}$$

command

```
integrate((B*x**3+A)/x**3/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A \Gamma\left(-\frac{2}{3}\right) {}_{2}F_{1}\left(\begin{matrix} -\frac{2}{3}, \frac{5}{2} \\ \frac{1}{3} \end{matrix}\middle| {\frac{b x^{3} e^{i \pi}}{a}} \right)}{3 a^{\frac{5}{2}} x^{2} \Gamma\left(\frac{1}{3}\right)} + \frac{B x \Gamma\left(\frac{1}{3}\right) {}_{2}F_{1}\left(\begin{matrix} \frac{1}{3}, \frac{5}{2} \\ \frac{4}{3} \end{matrix}\middle| {\frac{b x^{3} e^{i \pi}}{a}} \right)}{3 a^{\frac{5}{2}} \Gamma\left(\frac{4}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.12 Problem number 253

$$\int \frac{A + Bx^3}{x^6 \left(a + bx^3\right)^{5/2}} \, dx$$

Optimal antiderivative

$$-\frac{A}{5a\,x^5\,(b\,x^3+a)^{\frac{3}{2}}}+\frac{-19Ab+10Ba}{45a^2x^2\,(b\,x^3+a)^{\frac{3}{2}}}-\frac{13(19Ab-10Ba)}{135a^3x^2\sqrt{b\,x^3+a}}+\frac{91(19Ab-10Ba)\sqrt{b\,x^3+a}}{540a^4x^2}$$

$$+\frac{91b^{\frac{2}{3}}(19Ab-10Ba)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}+\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right.\right.}}}{1620a^4\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$

command

```
integrate((B*x**3+A)/x**6/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{5}{3}\right){}_2F_1\left(\begin{matrix}-\frac{5}{3},\frac{5}{2}\\-\frac{2}{3}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}x^5\Gamma\left(-\frac{2}{3}\right)}+\frac{B\Gamma\left(-\frac{2}{3}\right){}_2F_1\left(\begin{matrix}-\frac{2}{3},\frac{5}{2}\\\frac{1}{3}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}x^2\Gamma\left(\frac{1}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.13 Problem number 254

$$\int \frac{x^7 \left(A + Bx^3\right)}{\left(a + bx^3\right)^{5/2}} \, dx$$

Optimal antiderivative

$$
-\frac{2(7Ab-16Ba)\,x^5}{63b^2\,(b\,x^3+a)^{\frac{3}{2}}}+\frac{2B\,x^8}{7b\,(b\,x^3+a)^{\frac{3}{2}}}-\frac{20(7Ab-16Ba)\,x^2}{189b^3\sqrt{b\,x^3+a}}+\frac{80(7Ab-16Ba)\,\sqrt{b\,x^3+a}}{189b^{\frac{11}{3}}\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)}
$$

$$
+\frac{80a^{\frac{1}{3}}(7Ab-16Ba)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\sqrt{2}\,\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}\;3^{\frac{3}{4}}}{567b^{\frac{11}{3}}\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}
$$

$$
-\frac{40a^{\frac{1}{3}}(7Ab-16Ba)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticE}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}-\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right.\right.}}}{189b^{\frac{11}{3}}\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}
$$

command

```
integrate(x**7*(B*x**3+A)/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
\frac{Ax^8\Gamma\left(\frac{8}{3}\right)\,{}_2F_1\left(\left.\begin{matrix}\frac{5}{2},\frac{8}{3}\\\frac{11}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}\Gamma\left(\frac{11}{3}\right)}+\frac{Bx^{11}\Gamma\left(\frac{11}{3}\right)\,{}_2F_1\left(\left.\begin{matrix}\frac{5}{2},\frac{11}{3}\\\frac{14}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}\Gamma\left(\frac{14}{3}\right)}
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.14 Problem number 257

$$
\int\frac{A+Bx^3}{x^2\,(a+bx^3)^{5/2}}\,dx
$$

Optimal antiderivative

$$-\frac{A}{ax\left(b\,x^{3}+a\right)^{\frac{3}{2}}}-\frac{\left(11Ab-2Ba\right)x^{2}}{9a^{2}\left(b\,x^{3}+a\right)^{\frac{3}{2}}}-\frac{5\left(11Ab-2Ba\right)x^{2}}{27a^{3}\sqrt{b\,x^{3}+a}}+\frac{5\left(11Ab-2Ba\right)\sqrt{b\,x^{3}+a}}{27a^{3}b^{\frac{2}{3}}\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)}$$

$$+\frac{5\left(11Ab-2Ba\right)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\sqrt{2}\,\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^{2}}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}\,3^{\frac{3}{4}}}{81a^{\frac{8}{3}}b^{\frac{2}{3}}\sqrt{b\,x^{3}+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}}$$

$$-\frac{5\left(11Ab-2Ba\right)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticE}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}-\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^{2}}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}}{54a^{\frac{8}{3}}b^{\frac{2}{3}}\sqrt{b\,x^{3}+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}}$$

command

```
integrate((B*x**3+A)/x**2/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{1}{3}\right){}_{2}F_{1}\left(\begin{matrix}-\frac{1}{3},\frac{5}{2}\\ \frac{2}{3}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}x\Gamma\left(\frac{2}{3}\right)}+\frac{Bx^{2}\Gamma\left(\frac{2}{3}\right){}_{2}F_{1}\left(\begin{matrix}\frac{2}{3},\frac{5}{2}\\ \frac{5}{3}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}\Gamma\left(\frac{5}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.15 Problem number 258

$$\int\frac{A+Bx^{3}}{x^{5}\left(a+bx^{3}\right)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{A}{4a\,x^4\left(b\,x^3+a\right)^{\frac{3}{2}}}+\frac{-17Ab+8Ba}{36a^2x\left(b\,x^3+a\right)^{\frac{3}{2}}}-\frac{11(17Ab-8Ba)}{108a^3x\sqrt{b\,x^3+a}}+\frac{55(17Ab-8Ba)\sqrt{b\,x^3+a}}{216a^4x}-\frac{55b^{\frac{1}{3}}(17Ab-8Ba)\sqrt{b\,x^3+a}}{216a^4\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)}$$

$$-\frac{55b^{\frac{1}{3}}(17Ab-8Ba)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\text{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}\,3^{\frac{3}{4}}\sqrt{2}}{648a^{\frac{11}{3}}\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$

$$+\frac{55b^{\frac{1}{3}}(17Ab-8Ba)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\text{EllipticE}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}-\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}{432a^{\frac{11}{3}}\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$

command

```
integrate((B*x**3+A)/x**5/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{4}{3}\right){}_2F_1\left(\begin{matrix}-\frac{4}{3},\frac{5}{2}\\-\frac{1}{3}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}x^4\Gamma\left(-\frac{1}{3}\right)}+\frac{B\Gamma\left(-\frac{1}{3}\right){}_2F_1\left(\begin{matrix}-\frac{1}{3},\frac{5}{2}\\\frac{2}{3}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}x\Gamma\left(\frac{2}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.16 Problem number 295

$$\int\frac{x^{11}\left(c+dx^3\right)^{3/2}}{8c-dx^3}\,dx$$

Optimal antiderivative

$$-\frac{1024c^3(d\,x^3+c)^{\frac{3}{2}}}{9d^4}-\frac{38c^2(d\,x^3+c)^{\frac{5}{2}}}{5d^4}-\frac{4c(d\,x^3+c)^{\frac{7}{2}}}{7d^4}-\frac{2(d\,x^3+c)^{\frac{9}{2}}}{27d^4}+\frac{9216c^{\frac{9}{2}}\operatorname{arctanh}\left(\frac{\sqrt{d\,x^3+c}}{3\sqrt{c}}\right)}{d^4}-\frac{3072c^4\sqrt{d\,x^3+c}}{d^4}$$

command

```
integrate(x**11*(d*x**3+c)**(3/2)/(-d*x**3+8*c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{9216c^5\operatorname{atan}\left(\frac{\sqrt{c+dx^3}}{3\sqrt{-c}}\right)}{d^4\sqrt{-c}}-\frac{3072c^4\sqrt{c+dx^3}}{d^4}-\frac{1024c^3(c+dx^3)^{\frac{3}{2}}}{9d^4}-\frac{38c^2(c+dx^3)^{\frac{5}{2}}}{5d^4}-\frac{4c(c+dx^3)^{\frac{7}{2}}}{7d^4}-\frac{2(c+dx^3)^{\frac{9}{2}}}{27d^4}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.17 Problem number 536

$$\int (ex)^{5/2}\left(a+bx^3\right)^{5/2}\left(A+Bx^3\right)\,dx$$

Optimal antiderivative

$$\frac{15a(4Ab-Ba)(ex)^{\frac{7}{2}}(b\,x^3+a)^{\frac{3}{2}}}{704be}+\frac{(4Ab-Ba)(ex)^{\frac{7}{2}}(b\,x^3+a)^{\frac{5}{2}}}{44be}+\frac{B(ex)^{\frac{7}{2}}(b\,x^3+a)^{\frac{7}{2}}}{14be}+\frac{27a^2(4Ab-Ba)(ex)^{\frac{7}{2}}\sqrt{b\,x^3+a}}{1408be}+\frac{81a^3(4Ab-Ba)e^2\sqrt{ex}\,\sqrt{b\,x^3+a}}{5632b^2}$$

$$-\frac{27\,3^{\frac{3}{4}}a^{\frac{11}{3}}(4Ab-Ba)e^2\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\sqrt{\frac{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)^2}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)\operatorname{EllipticF}\left(\sqrt{1-\frac{\left(a^{\frac{1}{3}}+\cdots\right.}{\left(a^{\frac{1}{3}}+\cdots\right.}}\right.}{11264\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)b^2\sqrt{b\,x^3+a}\sqrt{\frac{b^{\frac{1}{3}}x\left(a\cdots\right.}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\cdots\right.}}}$$

command

```
integrate((e*x)**(5/2)*(b*x**3+a)**(5/2)*(B*x**3+A),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Aa^{\frac{5}{2}}e^{\frac{5}{2}}x^{\frac{7}{2}}\Gamma\left(\frac{7}{6}\right){}_{2}F_{1}\left(\begin{matrix}-\frac{1}{2},\frac{7}{6}\\ \frac{13}{6}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{13}{6}\right)}+\frac{2Aa^{\frac{3}{2}}be^{\frac{5}{2}}x^{\frac{13}{2}}\Gamma\left(\frac{13}{6}\right){}_{2}F_{1}\left(\begin{matrix}-\frac{1}{2},\frac{13}{6}\\ \frac{19}{6}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{19}{6}\right)}+\frac{A\sqrt{a}\,b^{2}e^{\frac{5}{2}}x^{\frac{19}{2}}\Gamma\left(\frac{19}{6}\right){}_{2}F_{1}\left(\begin{matrix}-\frac{1}{2},\frac{19}{6}\\ \frac{25}{6}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{25}{6}\right)}+\frac{Ba^{\frac{5}{2}}e^{\frac{5}{2}}x^{\frac{13}{2}}\Gamma\left(\frac{13}{6}\right){}_{2}F_{1}\left(\begin{matrix}-\frac{1}{2},\frac{13}{6}\\ \frac{19}{6}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{19}{6}\right)}+\frac{2Ba^{\frac{3}{2}}be^{\frac{5}{2}}x^{\frac{19}{2}}\Gamma\left(\frac{19}{6}\right){}_{2}F_{1}\left(\begin{matrix}-\frac{1}{2},\frac{19}{6}\\ \frac{25}{6}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{25}{6}\right)}+\frac{B\sqrt{a}\,b^{2}e^{\frac{5}{2}}x^{\frac{25}{2}}\Gamma\left(\frac{25}{6}\right){}_{2}F_{1}\left(\begin{matrix}-\frac{1}{2},\frac{25}{6}\\ \frac{31}{6}\end{matrix}\middle|\frac{bx^{3}e^{i\pi}}{a}\right)}{3\Gamma\left(\frac{31}{6}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.18 Problem number 553

$$\int \frac{(ex)^{3/2}\left(A+Bx^{3}\right)}{\left(a+bx^{3}\right)^{3/2}}\,dx$$

Optimal antiderivative

$$\frac{2(Ab-Ba)\,(ex)^{\frac{5}{2}}}{3abe\sqrt{b\,x^{3}+a}}-\frac{(2Ab-5Ba)\,e\left(1+\sqrt{3}\right)\sqrt{ex}\,\sqrt{b\,x^{3}+a}}{3a\,b^{\frac{5}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)}$$

$$+\frac{(2Ab-5Ba)\,e\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\sqrt{\frac{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)^{2}}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)^{2}}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)\mathrm{EllipticE}\left(\sqrt{1-\frac{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\right.\right.}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\right.\right.}}\right.}{3\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)a^{\frac{2}{3}}b^{\frac{5}{3}}\sqrt{b\,x^{3}+a}\,\sqrt{\frac{b^{\frac{1}{3}}x\left(a^{\frac{1}{3}}+\right.}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\right.\right.}}}$$

$$+\frac{(2Ab-5Ba)\,e\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\sqrt{\frac{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)^{2}}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)^{2}}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)\mathrm{EllipticF}\left(\sqrt{1-\frac{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\right.\right.}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\right.\right.}}\right.}{18\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)a^{\frac{2}{3}}b^{\frac{5}{3}}\sqrt{b\,x^{3}+a}\,\sqrt{\frac{b^{\frac{1}{3}}x\left(\right.}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}\right.}}}$$

command

```
integrate((e*x)**(3/2)*(B*x**3+A)/(b*x**3+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{3}{2}}x^{\frac{5}{2}}\Gamma\left(\frac{5}{6}\right){}_2F_1\left(\begin{matrix}\frac{5}{6},\frac{3}{2}\\ \frac{11}{6}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{3}{2}}\Gamma\left(\frac{11}{6}\right)}+\frac{Be^{\frac{3}{2}}x^{\frac{11}{2}}\Gamma\left(\frac{11}{6}\right){}_2F_1\left(\begin{matrix}\frac{3}{2},\frac{11}{6}\\ \frac{17}{6}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{3}{2}}\Gamma\left(\frac{17}{6}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.19 Problem number 557

$$\int \frac{A+Bx^3}{(ex)^{5/2}\left(a+bx^3\right)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A}{3ae\left(ex\right)^{\frac{3}{2}}\sqrt{b\,x^3+a}}-\frac{2(2Ab-Ba)\left(ex\right)^{\frac{3}{2}}}{3a^2e^4\sqrt{b\,x^3+a}}$$

command

```
integrate((B*x**3+A)/(e*x)**(5/2)/(b*x**3+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(-\frac{2}{3a\sqrt{b}\,e^{\frac{5}{2}}x^3\sqrt{\frac{a}{bx^3}+1}}-\frac{4\sqrt{b}}{3a^2e^{\frac{5}{2}}\sqrt{\frac{a}{bx^3}+1}}\right)+\frac{2B}{3a\sqrt{b}\,e^{\frac{5}{2}}\sqrt{\frac{a}{bx^3}+1}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.20 Problem number 558

$$\int \frac{A+Bx^3}{(ex)^{7/2}\left(a+bx^3\right)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2A}{5ae\,(ex)^{\frac{5}{2}}\sqrt{b\,x^3+a}}-\frac{2(8Ab-5Ba)\sqrt{ex}}{15a^2e^4\sqrt{b\,x^3+a}}$$
$$-\frac{2(8Ab-5Ba)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\sqrt{\frac{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)^2}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1+\sqrt{3}\right)\right)\mathrm{EllipticF}\left(\sqrt{1-\frac{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\cdots\right.\right.}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\cdots\right.\right.}}\cdots\right.}{45\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1-\sqrt{3}\right)\right)a^{\frac{7}{3}}e^4\sqrt{b\,x^3+a}\,\sqrt{\frac{b^{\frac{1}{3}}x\left(a^{\frac{1}{3}}+\cdots\right.}{\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\left(1\cdots\right.\right.}}}$$

command

```
integrate((B*x**3+A)/(e*x)**(7/2)/(b*x**3+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{5}{6}\right){}_2F_1\left(\begin{matrix}-\frac{5}{6},\frac{3}{2}\\ \frac{1}{6}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{3}{2}}e^{\frac{7}{2}}x^{\frac{5}{2}}\Gamma\left(\frac{1}{6}\right)}+\frac{B\sqrt{x}\,\Gamma\left(\frac{1}{6}\right){}_2F_1\left(\begin{matrix}\frac{1}{6},\frac{3}{2}\\ \frac{7}{6}\end{matrix}\middle|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{3}{2}}e^{\frac{7}{2}}\Gamma\left(\frac{7}{6}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.21 Problem number 562

$$\int \frac{\sqrt{ex}\,\left(A+Bx^3\right)}{\left(a+bx^3\right)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{2(Ab-Ba)\,(ex)^{\frac{3}{2}}}{9abe\,(b\,x^3+a)^{\frac{3}{2}}}+\frac{2(2Ab+Ba)\,(ex)^{\frac{3}{2}}}{9a^2be\sqrt{b\,x^3+a}}$$

command

```
integrate((B*x**3+A)*(e*x)**(1/2)/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$A\left(\frac{6a\sqrt{e}\,x^{\frac{3}{2}}}{9a^{\frac{7}{2}}\sqrt{1+\frac{bx^3}{a}}+9a^{\frac{5}{2}}bx^3\sqrt{1+\frac{bx^3}{a}}}+\frac{4b\sqrt{e}\,x^{\frac{9}{2}}}{9a^{\frac{7}{2}}\sqrt{1+\frac{bx^3}{a}}+9a^{\frac{5}{2}}bx^3\sqrt{1+\frac{bx^3}{a}}}\right)+\frac{2B\sqrt{e}\,x^{\frac{9}{2}}}{9a^{\frac{5}{2}}\sqrt{1+\frac{bx^3}{a}}+9a^{\frac{3}{2}}bx^3\sqrt{1+\frac{bx^3}{a}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.22 Problem number 946

$$\int\left(a+\frac{b}{x^2}\right)\left(c+\frac{d}{x^2}\right)^{3/2}x^3\,dx$$

Optimal antiderivative

$$\frac{(ad+4bc)\left(c+\frac{d}{x^2}\right)^{\frac{3}{2}}x^2}{8c}+\frac{a\left(c+\frac{d}{x^2}\right)^{\frac{5}{2}}x^4}{4c}+\frac{3d(ad+4bc)\operatorname{arctanh}\left(\frac{\sqrt{c+\frac{d}{x^2}}}{\sqrt{c}}\right)}{8\sqrt{c}}-\frac{3d(ad+4bc)\sqrt{c+\frac{d}{x^2}}}{8c}$$

command

```
integrate((a+b/x**2)*(c+d/x**2)**(3/2)*x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{ac^2x^5}{4\sqrt{d}\sqrt{\frac{cx^2}{d}+1}}+\frac{3ac\sqrt{d}\,x^3}{8\sqrt{\frac{cx^2}{d}+1}}+\frac{ad^{\frac{3}{2}}x\sqrt{\frac{cx^2}{d}+1}}{2}+\frac{ad^{\frac{3}{2}}x}{8\sqrt{\frac{cx^2}{d}+1}}+\frac{3ad^2\operatorname{asinh}\left(\frac{\sqrt{c}\,x}{\sqrt{d}}\right)}{8\sqrt{c}}+\frac{3b\sqrt{c}\,d\operatorname{asinh}\left(\frac{\sqrt{c}\,x}{\sqrt{d}}\right)}{2}+\frac{bc\sqrt{d}\,x\sqrt{\frac{cx^2}{d}+1}}{2}-\frac{bc\sqrt{d}\,x}{\sqrt{\frac{cx^2}{d}+1}}-\frac{bd^{\frac{3}{2}}}{x\sqrt{\frac{cx^2}{d}+1}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.23 Problem number 1045

$$\int \frac{x^{-1+3n}(a+bx^n)^3}{c+dx^n}\,dx$$

Optimal antiderivative

$$\frac{c(-ad+bc)^3\,x^n}{d^5n}-\frac{(-ad+bc)^3\,x^{2n}}{2d^4n}+\frac{b\left(3a^2d^2-3abcd+b^2c^2\right)x^{3n}}{3d^3n} \\ -\frac{b^2(-3ad+bc)\,x^{4n}}{4d^2n}+\frac{b^3x^{5n}}{5dn}-\frac{c^2(-ad+bc)^3\ln\left(c+d\,x^n\right)}{d^6n}$$

command

```
integrate(x**(-1+3*n)*(a+b*x**n)**3/(c+d*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{(a+b)^3\log(x)}{c} \\ \frac{(a+b)^3\log(x)}{c+d} \\ \frac{\frac{a^3x^{3n}}{3n}+\frac{3a^2bx^{4n}}{4n}+\frac{3ab^2x^{5n}}{5n}+\frac{b^3x^{6n}}{6n}}{c} \\ \frac{a^3c^2\log\left(\frac{c}{d}+x^n\right)}{d^3n}-\frac{a^3cx^n}{d^2n}+\frac{a^3x^{2n}}{2dn}-\frac{3a^2bc^3\log\left(\frac{c}{d}+x^n\right)}{d^4n}+\frac{3a^2bc^2x^n}{d^3n}-\frac{3a^2bcx^{2n}}{2d^2n}+\frac{a^2bx^{3n}}{dn}+\frac{3ab^2c^4\log\left(\frac{c}{d}+x^n\right)}{d^5n}-\frac{3ab^2c^3x^n}{d^4n}+3ab \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

17.24 Problem number 1046

$$\int \frac{x^{-1+3n}(a+bx^n)^2}{c+dx^n}\,dx$$

Optimal antiderivative

$$-\frac{c(-ad+bc)^2\,x^n}{d^4n}+\frac{(-ad+bc)^2\,x^{2n}}{2d^3n}-\frac{b(-2ad+bc)\,x^{3n}}{3d^2n}+\frac{b^2x^{4n}}{4dn}+\frac{c^2(-ad+bc)^2\ln\left(c+d\,x^n\right)}{d^5n}$$

command

```
integrate(x**(-1+3*n)*(a+b*x**n)**2/(c+d*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{(a+b)^2 \log(x)}{c} \\ \frac{(a+b)^2 \log(x)}{c+d} \\ \frac{\frac{a^2 x^{3n}}{3n} + \frac{abx^{4n}}{2n} + \frac{b^2 x^{5n}}{5n}}{c} \\ \frac{a^2 c^2 \log\left(\frac{c}{d}+x^n\right)}{d^3 n} - \frac{a^2 c x^n}{d^2 n} + \frac{a^2 x^{2n}}{2dn} - \frac{2abc^3 \log\left(\frac{c}{d}+x^n\right)}{d^4 n} + \frac{2abc^2 x^n}{d^3 n} - \frac{abcx^{2n}}{d^2 n} + \frac{2abx^{3n}}{3dn} + \frac{b^2 c^4 \log\left(\frac{c}{d}+x^n\right)}{d^5 n} - \frac{b^2 c^3 x^n}{d^4 n} + \frac{b^2 c^2 x^{2n}}{2d^3 n} - \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: HeuristicGCDFailed

17.25 Problem number 1064

$$\int \frac{x^{31}\sqrt{1+x^{16}}}{1-x^{16}}\,dx$$

Optimal antiderivative

$$-\frac{(x^{16}+1)^{\frac{3}{2}}}{24} + \frac{\operatorname{arctanh}\left(\frac{\sqrt{x^{16}+1}\,\sqrt{2}}{2}\right)\sqrt{2}}{8} - \frac{\sqrt{x^{16}+1}}{8}$$

command

```
integrate(x**31*(x**16+1)**(1/2)/(-x**16+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{(x^{16}+1)^{\frac{3}{2}}}{24} - \frac{\sqrt{x^{16}+1}}{8} - \frac{\begin{cases} -\frac{\sqrt{2}\,\operatorname{acoth}\left(\frac{\sqrt{2}\,\sqrt{x^{16}+1}}{2}\right)}{2} & \text{for } x^{16} > 1 \\ -\frac{\sqrt{2}\,\operatorname{atanh}\left(\frac{\sqrt{2}\,\sqrt{x^{16}+1}}{2}\right)}{2} & \text{for } x^{16} < 1 \end{cases}}{4}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

18 Test file number 28

Test folder name:

`test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.3_General/28_1.1.3.6-g_x-^m-a+b_x^n-^p-c+d_x^n-^q-e+f_x^n-^r`

18.1 Problem number 1

$$\int (ex)^m (a+bx^n)^3 (A+Bx^n) (c+dx^n) \, dx$$

Optimal antiderivative

$$\frac{a^2(aAd+3Abc+aBc)\,x^{1+n}(ex)^m}{1+m+n}+\frac{a(3Ab(ad+bc)+aB(ad+3bc))\,x^{1+2n}(ex)^m}{1+m+2n}+\frac{b(3aB(ad+bc)+Ab(3ad+bc))\,x^{1+3n}(ex)^m}{1+m+3n}+\frac{b^2(Abd+3aBd+bBc)\,x^{1+4n}(ex)^m}{1+m+4n}+\frac{b^3Bd\,x^{1+5n}(ex)^m}{1+m+5n}+\frac{a^3Ac(ex)^{1+m}}{e\,(1+m)}$$

command

```
integrate((e*x)**m*(a+b*x**n)**3*(A+B*x**n)*(c+d*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

18.2 Problem number 2

$$\int (ex)^m (a+bx^n)^2 (A+Bx^n) (c+dx^n) \, dx$$

Optimal antiderivative

$$\frac{a(aAd+2Abc+aBc)\,x^{1+n}(ex)^m}{1+m+n}+\frac{(aB(ad+2bc)+Ab(2ad+bc))\,x^{1+2n}(ex)^m}{1+m+2n}+\frac{b(Abd+2aBd+bBc)\,x^{1+3n}(ex)^m}{1+m+3n}+\frac{b^2Bd\,x^{1+4n}(ex)^m}{1+m+4n}+\frac{a^2Ac(ex)^{1+m}}{e\,(1+m)}$$

command

```
integrate((e*x)**m*(a+b*x**n)**2*(A+B*x**n)*(c+d*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

18.3 Problem number 9

$$\int (ex)^m (a+bx^n)^2 (A+Bx^n) (c+dx^n)^2 \, dx$$

Optimal antiderivative

$$\frac{ac(aBc+2A(ad+bc))\,x^{1+n}(ex)^m}{1+m+n} + \frac{\left(2aBc(ad+bc)+A\left(a^2d^2+4abcd+b^2c^2\right)\right)x^{1+2n}(ex)^m}{1+m+2n} + \frac{\left(a^2B\,d^2+2abd(Ad+2Bc)+b^2c(2Ad+Bc)\right)x^{1+3n}(ex)^m}{1+m+3n} + \frac{bd(Abd+2aBd+2bBc)\,x^{1+4n}(ex)^m}{1+m+4n} + \frac{b^2B\,d^2x^{1+5n}(ex)^m}{1+m+5n} + \frac{a^2A\,c^2(ex)^{1+m}}{e\,(1+m)}$$

command

```
integrate((e*x)**m*(a+b*x**n)**2*(A+B*x**n)*(c+d*x**n)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

18.4 Problem number 10

$$\int (ex)^m (a+bx^n) (A+Bx^n) (c+dx^n)^2 \, dx$$

Optimal antiderivative

$$\frac{c(2aAd+Abc+aBc)\,x^{1+n}(ex)^m}{1+m+n} + \frac{(ad(Ad+2Bc)+bc(2Ad+Bc))\,x^{1+2n}(ex)^m}{1+m+2n} + \frac{d(Abd+aBd+2bBc)\,x^{1+3n}(ex)^m}{1+m+3n} + \frac{bB\,d^2x^{1+4n}(ex)^m}{1+m+4n} + \frac{aA\,c^2(ex)^{1+m}}{e\,(1+m)}$$

command

```
integrate((e*x)**m*(a+b*x**n)*(A+B*x**n)*(c+d*x**n)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

18.5 Problem number 17

$$\int (ex)^m (a+bx^n)(A+Bx^n)(c+dx^n)^3 \, dx$$

Optimal antiderivative

$$\frac{c^2(3aAd+Abc+aBc)\,x^{1+n}(ex)^m}{1+m+n}+\frac{c(3ad(Ad+Bc)+bc(3Ad+Bc))\,x^{1+2n}(ex)^m}{1+m+2n}$$
$$+\frac{d(3bc(Ad+Bc)+ad(Ad+3Bc))\,x^{1+3n}(ex)^m}{1+m+3n}$$
$$+\frac{d^2(Abd+aBd+3bBc)\,x^{1+4n}(ex)^m}{1+m+4n}+\frac{bB\,d^3x^{1+5n}(ex)^m}{1+m+5n}+\frac{aA\,c^3(ex)^{1+m}}{e\,(1+m)}$$

command

```
integrate((e*x)**m*(a+b*x**n)*(A+B*x**n)*(c+d*x**n)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

18.6 Problem number 18

$$\int (ex)^m (A+Bx^n)(c+dx^n)^3 \, dx$$

Optimal antiderivative

$$\frac{c^2(3Ad+Bc)\,x^{1+n}(ex)^m}{1+m+n}+\frac{3cd(Ad+Bc)\,x^{1+2n}(ex)^m}{1+m+2n}$$
$$+\frac{d^2(Ad+3Bc)\,x^{1+3n}(ex)^m}{1+m+3n}+\frac{B\,d^3x^{1+4n}(ex)^m}{1+m+4n}+\frac{A\,c^3(ex)^{1+m}}{e\,(1+m)}$$

command

```
integrate((e*x)**m*(A+B*x**n)*(c+d*x**n)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

19 Test file number 29

Test folder name:

```
test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.3_General/29_1.1.3.8_P-x-c_x-^m-a+b_x^n-^p
```

19.1 Problem number 3

$$\int \frac{(c+dx+ex^2)^3}{\sqrt{a+bx}}\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{2(-2ae+bd)\left(a^2e-abd+b^2c\right)^2(bx+a)^{\frac{3}{2}}}{b^7}\\&-\frac{6\left(a^2e-abd+b^2c\right)\left(5abde-5a^2e^2-b^2\left(ce+d^2\right)\right)(bx+a)^{\frac{5}{2}}}{5b^7}\\&-\frac{2(-2ae+bd)\left(10abde-10a^2e^2-b^2\left(6ce+d^2\right)\right)(bx+a)^{\frac{7}{2}}}{7b^7}\\&-\frac{2e\left(5abde-5a^2e^2-b^2\left(ce+d^2\right)\right)(bx+a)^{\frac{9}{2}}}{3b^7}+\frac{6e^2(-2ae+bd)(bx+a)^{\frac{11}{2}}}{11b^7}\\&+\frac{2e^3(bx+a)^{\frac{13}{2}}}{13b^7}+\frac{2\left(a^2e-abd+b^2c\right)^3\sqrt{bx+a}}{b^7}\end{aligned}$$

command

```
integrate((e*x**2+d*x+c)**3/(b*x+a)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

19.2 Problem number 5

$$\int \frac{(c+dx+ex^2+fx^3)^2}{\sqrt{a+bx}}\,dx$$

Optimal antiderivative

$$\frac{4(3a^2f-2abe+b^2d)\,(-a^3f+a^2be-a\,b^2d+b^3c)\,(bx+a)^{\frac{3}{2}}}{3b^7}$$
$$+\frac{2\left(b^4(2ce+d^2)-20a^3bef+15a^4f^2-6a\,b^3(cf+de)+6a^2b^2(2df+e^2)\right)(bx+a)^{\frac{5}{2}}}{5b^7}$$
$$+\frac{4\left(10a^2bef-10a^3f^2+b^3(cf+de)-2a\,b^2(2df+e^2)\right)(bx+a)^{\frac{7}{2}}}{7b^7}$$
$$-\frac{2\left(10abef-15a^2f^2-b^2(2df+e^2)\right)(bx+a)^{\frac{9}{2}}}{9b^7}+\frac{4f(-3af+be)\,(bx+a)^{\frac{11}{2}}}{11b^7}$$
$$+\frac{2f^2(bx+a)^{\frac{13}{2}}}{13b^7}+\frac{2(-a^3f+a^2be-a\,b^2d+b^3c)^2\sqrt{bx+a}}{b^7}$$

command

```
integrate((f*x**3+e*x**2+d*x+c)**2/(b*x+a)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

19.3 Problem number 6

$$\int \frac{(c+dx+ex^2+fx^3)^3}{\sqrt{a+bx}}\,dx$$

Optimal antiderivative

$$
\frac{2(3a^2f-2abe+b^2d)\left(-a^3f+a^2be-a\,b^2d+b^3c\right)^2(bx+a)^{\frac{3}{2}}}{b^{10}}
+\frac{6(-a^3f+a^2be-a\,b^2d+b^3c)\left(b^4(ce+d^2)-16a^3bef+12a^4f^2-a\,b^3(3cf+5de)+a^2b^2(9df+5e^2)\right)(bx+a)^{\frac{5}{2}}}{5b^{10}}
-\frac{2\left(168a^5bef^2-84a^6f^3-b^6(3c^2f+6cde+d^3)-105a^4b^2f(df+e^2)+12a\,b^5(2cdf+ce^2+d^2e)-30a^2b^4(2cef\right.}{7b^{10}}
+\frac{2\left(70a^4bef^2-42a^5f^3-35a^3b^2f(df+e^2)+b^5(2cdf+ce^2+d^2e)-5a\,b^4(2cef+d^2f+de^2)+5a^2b^3(3cf^2+6a\right.}{3b^{10}}
-\frac{6\left(56a^3bef^2-42a^4f^3-21a^2b^2f(df+e^2)-b^4(2cef+d^2f+de^2)+2a\,b^3(3cf^2+6def+e^3)\right)(bx+a)^{\frac{11}{2}}}{11b^{10}}
+\frac{2\left(84a^2bef^2-84a^3f^3-21a\,b^2f(df+e^2)+b^3(3cf^2+6def+e^3)\right)(bx+a)^{\frac{13}{2}}}{13b^{10}}
-\frac{2f\left(8abef-12a^2f^2-b^2(df+e^2)\right)(bx+a)^{\frac{15}{2}}}{5b^{10}}
+\frac{6f^2(-3af+be)(bx+a)^{\frac{17}{2}}}{17b^{10}}
+\frac{2f^3(bx+a)^{\frac{19}{2}}}{19b^{10}}
+\frac{2\left(-a^3f+a^2be-a\,b^2d+b^3c\right)^3\sqrt{bx+a}}{b^{10}}
$$

command

```
integrate((f*x**3+e*x**2+d*x+c)**3/(b*x+a)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

19.4 Problem number 65

$$
\int \frac{ac+adx+bcx^3+bdx^4}{\left(a+bx^3\right)^{9/2}}\,dx
$$

Optimal antiderivative

$$\frac{2x(dx+c)}{15a\left(b\,x^{3}+a\right)^{\frac{5}{2}}}+\frac{2x(11dx+13c)}{135a^{2}\left(b\,x^{3}+a\right)^{\frac{3}{2}}}+\frac{2x(55dx+91c)}{405a^{3}\sqrt{b\,x^{3}+a}}-\frac{22d\sqrt{b\,x^{3}+a}}{81a^{3}b^{\frac{2}{3}}\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)}$$

$$+\frac{11d\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\operatorname{EllipticE}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}-\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^{2}}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}\,3^{\frac{1}{4}}}{81a^{\frac{8}{3}}b^{\frac{2}{3}}\sqrt{b\,x^{3}+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}}$$

$$+\frac{2\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\operatorname{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(91b^{\frac{1}{3}}c+55a^{\frac{1}{3}}d\left(1-\sqrt{3}\right)\right)\left(\frac{\sqrt{6}}{2}+\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}}{(b^{\frac{1}{3}}x+a^{\frac{1}{3}}}}}{1215a^{3}b^{\frac{2}{3}}\sqrt{b\,x^{3}+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^{2}}}}$$

command

```
integrate((b*d*x**4+b*c*x**3+a*d*x+a*c)/(b*x**3+a)**(9/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{cx\Gamma\left(\frac{1}{3}\right){}_{2}F_{1}\left(\left.\begin{matrix}\frac{1}{3},\frac{9}{2}\\\frac{4}{3}\end{matrix}\right|\frac{bx^{3}e^{i\pi}}{a}\right)}{3a^{\frac{7}{2}}\Gamma\left(\frac{4}{3}\right)}+\frac{dx^{2}\Gamma\left(\frac{2}{3}\right){}_{2}F_{1}\left(\left.\begin{matrix}\frac{2}{3},\frac{9}{2}\\\frac{5}{3}\end{matrix}\right|\frac{bx^{3}e^{i\pi}}{a}\right)}{3a^{\frac{7}{2}}\Gamma\left(\frac{5}{3}\right)}+\frac{bcx^{4}\Gamma\left(\frac{4}{3}\right){}_{2}F_{1}\left(\left.\begin{matrix}\frac{4}{3},\frac{9}{2}\\\frac{7}{3}\end{matrix}\right|\frac{bx^{3}e^{i\pi}}{a}\right)}{3a^{\frac{9}{2}}\Gamma\left(\frac{7}{3}\right)}+\frac{bdx^{5}\Gamma\left(\frac{5}{3}\right){}_{2}F_{1}\left(\left.\begin{matrix}\frac{5}{3},\frac{9}{2}\\\frac{8}{3}\end{matrix}\right|\frac{bx^{3}e^{i\pi}}{a}\right)}{3a^{\frac{9}{2}}\Gamma\left(\frac{8}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

19.5 Problem number 68

$$\int \frac{c+dx+ex^2+fx^3+gx^4}{(a+bx^3)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{2x\left(bc-af+(-ag+bd)\,x+be\,x^2\right)}{9ab\,(b\,x^3+a)^{\frac{3}{2}}}$$
$$-\frac{2(3ae-x(7bc+2af+(4ag+5bd)\,x))}{27a^2b\sqrt{b\,x^3+a}}-\frac{2(4ag+5bd)\,\sqrt{b\,x^3+a}}{27a^2b^{\frac{5}{3}}\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)}$$
$$+\frac{(4ag+5bd)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\operatorname{EllipticE}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}-\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}\;3^{\frac{1}{4}}}{27a^{\frac{5}{3}}b^{\frac{5}{3}}\sqrt{b\,x^3+a}\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$
$$+\frac{2\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\operatorname{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(b^{\frac{1}{3}}(2af+7bc)+a^{\frac{1}{3}}(4ag+5bd)\left(1-\sqrt{3}\right)\right)\left(\frac{\sqrt{6}}{2}+\frac{\sqrt{2}}{2}\right.}{81a^2b^{\frac{5}{3}}\sqrt{b\,x^3+a}\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$

command

```
integrate((g*x**4+f*x**3+e*x**2+d*x+c)/(b*x**3+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$e\left(\begin{cases}-\frac{2}{9ab\sqrt{a+bx^3}+9b^2x^3\sqrt{a+bx^3}} & \text{for } b\neq 0\\ \frac{x^3}{3a^{\frac{5}{2}}} & \text{otherwise}\end{cases}\right)+\frac{cx\Gamma\left(\frac{1}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{1}{3},\frac{5}{2}\\ \frac{4}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}\Gamma\left(\frac{4}{3}\right)}$$
$$+\frac{dx^2\Gamma\left(\frac{2}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{2}{3},\frac{5}{2}\\ \frac{5}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}\Gamma\left(\frac{5}{3}\right)}+\frac{fx^4\Gamma\left(\frac{4}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{4}{3},\frac{5}{2}\\ \frac{7}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}\Gamma\left(\frac{7}{3}\right)}+\frac{gx^5\Gamma\left(\frac{5}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{5}{3},\frac{5}{2}\\ \frac{8}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{5}{2}}\Gamma\left(\frac{8}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

19.6 Problem number 69

$$\int \frac{c+dx+ex^2+fx^3+gx^4}{(a+bx^3)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2x(bc-af+(-ag+bd)\,x+be\,x^2)}{15ab\,(b\,x^3+a)^{\frac{5}{2}}}-\frac{2(9ae-x(13bc+2af+(4ag+11bd)\,x))}{135a^2b\,(b\,x^3+a)^{\frac{3}{2}}}$$
$$+\frac{2x(14af+91bc+5(4ag+11bd)\,x)}{405a^3b\sqrt{b\,x^3+a}}-\frac{2(4ag+11bd)\,\sqrt{b\,x^3+a}}{81a^3b^{\frac{5}{3}}\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)}$$
$$+\frac{(4ag+11bd)\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticE}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}-\frac{\sqrt{2}}{2}\right)\sqrt{\frac{a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}\ 3}{81a^{\frac{8}{3}}b^{\frac{5}{3}}\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$
$$+\frac{2\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)\mathrm{EllipticF}\left(\frac{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(7b^{\frac{1}{3}}(2af+13bc)+5a^{\frac{1}{3}}(4ag+11bd)\left(1-\sqrt{3}\right)\right)\left(\frac{\sqrt{6}}{2}-\right.}{1215a^3b^{\frac{5}{3}}\sqrt{b\,x^3+a}\,\sqrt{\frac{a^{\frac{1}{3}}\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{\left(b^{\frac{1}{3}}x+a^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$

command

```
integrate((g*x**4+f*x**3+e*x**2+d*x+c)/(b*x**3+a)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$e\left(\begin{cases}-\frac{2}{15a^2b\sqrt{a+bx^3}+30ab^2x^3\sqrt{a+bx^3}+15b^3x^6\sqrt{a+bx^3}} & \text{for } b\neq 0\\ \frac{x^3}{3a^{\frac{7}{2}}} & \text{otherwise}\end{cases}\right)$$
$$+\frac{cx\Gamma\left(\frac{1}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{1}{3},\frac{7}{2}\\ \frac{4}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{7}{2}}\Gamma\left(\frac{4}{3}\right)}+\frac{dx^2\Gamma\left(\frac{2}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{2}{3},\frac{7}{2}\\ \frac{5}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{7}{2}}\Gamma\left(\frac{5}{3}\right)}$$
$$+\frac{fx^4\Gamma\left(\frac{4}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{4}{3},\frac{7}{2}\\ \frac{7}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{7}{2}}\Gamma\left(\frac{7}{3}\right)}+\frac{gx^5\Gamma\left(\frac{5}{3}\right){}_2F_1\left(\left.\begin{matrix}\frac{5}{3},\frac{7}{2}\\ \frac{8}{3}\end{matrix}\right|\frac{bx^3e^{i\pi}}{a}\right)}{3a^{\frac{7}{2}}\Gamma\left(\frac{8}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

19.7 Problem number 586

$$\int (cx)^m \left(d+ex+fx^2+gx^3\right)(a+bx^n)^p\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{d(cx)^{1+m}(a+b\,x^n)^p \operatorname{hypergeom}\left(\left[-p,\frac{1+m}{n}\right],\left[\frac{1+m+n}{n}\right],-\frac{b\,x^n}{a}\right)\left(1+\frac{b\,x^n}{a}\right)^{-p}}{c\,(1+m)}\\&+\frac{e(cx)^{2+m}(a+b\,x^n)^p \operatorname{hypergeom}\left(\left[-p,\frac{2+m}{n}\right],\left[\frac{2+m+n}{n}\right],-\frac{b\,x^n}{a}\right)\left(1+\frac{b\,x^n}{a}\right)^{-p}}{c^2\,(2+m)}\\&+\frac{f(cx)^{3+m}(a+b\,x^n)^p \operatorname{hypergeom}\left(\left[-p,\frac{3+m}{n}\right],\left[\frac{3+m+n}{n}\right],-\frac{b\,x^n}{a}\right)\left(1+\frac{b\,x^n}{a}\right)^{-p}}{c^3\,(3+m)}\\&+\frac{g(cx)^{4+m}(a+b\,x^n)^p \operatorname{hypergeom}\left(\left[-p,\frac{4+m}{n}\right],\left[\frac{4+m+n}{n}\right],-\frac{b\,x^n}{a}\right)\left(1+\frac{b\,x^n}{a}\right)^{-p}}{c^4\,(4+m)}\end{aligned}$$

command

```
integrate((c*x)**m*(g*x**3+f*x**2+e*x+d)*(a+b*x**n)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}&\frac{a^pc^mdxx^m\Gamma\left(\frac{m}{n}+\frac{1}{n}\right){}_2F_1\left(\left.\begin{matrix}-p,\frac{m}{n}+\frac{1}{n}\\ \frac{m}{n}+1+\frac{1}{n}\end{matrix}\right|\frac{bx^ne^{i\pi}}{a}\right)}{n\Gamma\left(\frac{m}{n}+1+\frac{1}{n}\right)}\\&+\frac{a^pc^mex^2x^m\Gamma\left(\frac{m}{n}+\frac{2}{n}\right){}_2F_1\left(\left.\begin{matrix}-p,\frac{m}{n}+\frac{2}{n}\\ \frac{m}{n}+1+\frac{2}{n}\end{matrix}\right|\frac{bx^ne^{i\pi}}{a}\right)}{n\Gamma\left(\frac{m}{n}+1+\frac{2}{n}\right)}\\&+\frac{a^pc^mfx^3x^m\Gamma\left(\frac{m}{n}+\frac{3}{n}\right){}_2F_1\left(\left.\begin{matrix}-p,\frac{m}{n}+\frac{3}{n}\\ \frac{m}{n}+1+\frac{3}{n}\end{matrix}\right|\frac{bx^ne^{i\pi}}{a}\right)}{n\Gamma\left(\frac{m}{n}+1+\frac{3}{n}\right)}\\&+\frac{a^pc^mgx^4x^m\Gamma\left(\frac{m}{n}+\frac{4}{n}\right){}_2F_1\left(\left.\begin{matrix}-p,\frac{m}{n}+\frac{4}{n}\\ \frac{m}{n}+1+\frac{4}{n}\end{matrix}\right|\frac{bx^ne^{i\pi}}{a}\right)}{n\Gamma\left(\frac{m}{n}+1+\frac{4}{n}\right)}\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

20 Test file number 30

Test folder name:

`test_cases/1_Algebraic_functions/1.1_Binomial_products/1.1.4_Improper/30_1.1.4.2-c_x-^m-a_x^j+b_x^n-^p`

20.1 Problem number 336

$$\int (ax^m + bx^{1+6m})^5 \, dx$$

Optimal antiderivative

$$\frac{(a + b\,x^{1+5m})^6}{6b\,(1+5m)}$$

command

`integrate((a*x**m+b*x**(1+6*m))**5,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{6a^5xx^{5m}}{30m+6} + \frac{15a^4bx^2x^{10m}}{30m+6} + \frac{20a^3b^2x^3x^{15m}}{30m+6} + \frac{15a^2b^3x^4x^{20m}}{30m+6} + \frac{6ab^4x^5x^{25m}}{30m+6} + \frac{b^5x^6x^{30m}}{30m+6} & \text{for } m \neq -\frac{1}{5} \\ a^5 \log(x) + 5a^4b\log(x) + 10a^3b^2\log(x) + 10a^2b^3\log(x) + 5ab^4\log(x) + b^5\log(x) & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21 Test file number 33

Test folder name:

`test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.1_Quadratic/33_1.2.1.2-d+e_x-^m-a+b_x+c_x^2-^p`

21.1 Problem number 370

$$\int \frac{(d+ex)^{7/2}}{(bx+cx^2)^2} \, dx$$

Optimal antiderivative

$$\frac{e(-be+2cd)\,(ex+d)^{\frac{3}{2}}}{b^2c}-\frac{(ex+d)^{\frac{5}{2}}\,(bd+(-be+2cd)\,x)}{b^2\,(c\,x^2+bx)} +\frac{d^{\frac{5}{2}}(-7be+4cd)\operatorname{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)}{b^3} -\frac{(-be+cd)^{\frac{5}{2}}\,(3be+4cd)\operatorname{arctanh}\left(\frac{\sqrt{c}\,\sqrt{ex+d}}{\sqrt{-be+cd}}\right)}{b^3c^{\frac{5}{2}}}+\frac{e\left(3b^2e^2-2bcde+2c^2d^2\right)\sqrt{ex+d}}{b^2c^2}$$

command

```
integrate((e*x+d)**(7/2)/(c*x**2+b*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.2 Problem number 371

$$\int\frac{(d+ex)^{5/2}}{(bx+cx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{(ex+d)^{\frac{3}{2}}\,(bd+(-be+2cd)\,x)}{b^2\,(c\,x^2+bx)}+\frac{d^{\frac{3}{2}}(-5be+4cd)\operatorname{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)}{b^3} -\frac{(-be+cd)^{\frac{3}{2}}\,(be+4cd)\operatorname{arctanh}\left(\frac{\sqrt{c}\,\sqrt{ex+d}}{\sqrt{-be+cd}}\right)}{b^3c^{\frac{3}{2}}}+\frac{e(-be+2cd)\,\sqrt{ex+d}}{b^2c}$$

command

```
integrate((e*x+d)**(5/2)/(c*x**2+b*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.3 Problem number 372

$$\int \frac{(d+ex)^{3/2}}{(bx+cx^2)^2}\,dx$$

Optimal antiderivative

$$\frac{(-3be+4cd)\operatorname{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)\sqrt{d}}{b^3} - \frac{(-be+4cd)\operatorname{arctanh}\left(\frac{\sqrt{c}\,\sqrt{ex+d}}{\sqrt{-be+cd}}\right)\sqrt{-be+cd}}{b^3\sqrt{c}} - \frac{(bd+(-be+2cd)\,x)\,\sqrt{ex+d}}{b^2\,(c\,x^2+bx)}$$

command

```
integrate((e*x+d)**(3/2)/(c*x**2+b*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
\frac{2c^2d^2e\sqrt{d+ex}}{2b^4e^2-2b^3cde+2b^3ce^2x-2b^2c^2dex}-\frac{4cde^2\sqrt{d+ex}}{2b^3e^2-2b^2cde+2b^2ce^2x-2bc^2dex}
$$

$$
-\frac{e^3\sqrt{-\frac{1}{c(be-cd)^3}}\log\left(-b^2e^2\sqrt{-\frac{1}{c(be-cd)^3}}+2bcde\sqrt{-\frac{1}{c(be-cd)^3}}-c^2d^2\sqrt{-\frac{1}{c(be-cd)^3}}+\sqrt{d+ex}\right)}{2}
$$

$$
+\frac{e^3\sqrt{-\frac{1}{c(be-cd)^3}}\log\left(b^2e^2\sqrt{-\frac{1}{c(be-cd)^3}}-2bcde\sqrt{-\frac{1}{c(be-cd)^3}}+c^2d^2\sqrt{-\frac{1}{c(be-cd)^3}}+\sqrt{d+ex}\right)}{2}
$$

$$
+\frac{2e^3\sqrt{d+ex}}{2b^2e^2-2bcde+2bce^2x-2c^2dex}
$$

$$
+\frac{cde^2\sqrt{-\frac{1}{c(be-cd)^3}}\log\left(-b^2e^2\sqrt{-\frac{1}{c(be-cd)^3}}+2bcde\sqrt{-\frac{1}{c(be-cd)^3}}-c^2d^2\sqrt{-\frac{1}{c(be-cd)^3}}+\sqrt{d+ex}\right)}{b}
$$

$$
-\frac{cde^2\sqrt{-\frac{1}{c(be-cd)^3}}\log\left(b^2e^2\sqrt{-\frac{1}{c(be-cd)^3}}-2bcde\sqrt{-\frac{1}{c(be-cd)^3}}+c^2d^2\sqrt{-\frac{1}{c(be-cd)^3}}+\sqrt{d+ex}\right)}{b}
$$

$$
-\frac{c^2d^2e\sqrt{-\frac{1}{c(be-cd)^3}}\log\left(-b^2e^2\sqrt{-\frac{1}{c(be-cd)^3}}+2bcde\sqrt{-\frac{1}{c(be-cd)^3}}-c^2d^2\sqrt{-\frac{1}{c(be-cd)^3}}+\sqrt{d+ex}\right)}{2b^2}
$$

$$
+\frac{c^2d^2e\sqrt{-\frac{1}{c(be-cd)^3}}\log\left(b^2e^2\sqrt{-\frac{1}{c(be-cd)^3}}-2bcde\sqrt{-\frac{1}{c(be-cd)^3}}+c^2d^2\sqrt{-\frac{1}{c(be-cd)^3}}+\sqrt{d+ex}\right)}{2b^2}
$$

$$
-\frac{d^2e\sqrt{\frac{1}{d^3}}\log\left(-d^2\sqrt{\frac{1}{d^3}}+\sqrt{d+ex}\right)}{2b^2}+\frac{d^2e\sqrt{\frac{1}{d^3}}\log\left(d^2\sqrt{\frac{1}{d^3}}+\sqrt{d+ex}\right)}{2b^2}
$$

$$
-\frac{4de\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{be}{c}-d}}\right)}{b^2\sqrt{\frac{be}{c}-d}}+\frac{4de\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{-d}}\right)}{b^2\sqrt{-d}}-\frac{d\sqrt{d+ex}}{b^2x}
$$

$$
+\frac{4cd^2\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{be}{c}-d}}\right)}{b^3\sqrt{\frac{be}{c}-d}}-\frac{4cd^2\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{-d}}\right)}{b^3\sqrt{-d}}
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.4 Problem number 440

$$\int (d+ex)^m \left(bx+cx^2\right)^3 \, dx$$

Optimal antiderivative

$$\frac{d^3(-be+cd)^3 (ex+d)^{1+m}}{e^7 (1+m)} - \frac{3d^2(-be+cd)^2 (-be+2cd) (ex+d)^{2+m}}{e^7 (2+m)} + \frac{3d(-be+cd) \left(b^2e^2-5bcde+5c^2d^2\right) (ex+d)^{3+m}}{e^7 (3+m)} - \frac{(-be+2cd) \left(b^2e^2-10bcde+10c^2d^2\right) (ex+d)^{4+m}}{e^7 (4+m)} + \frac{3c\left(b^2e^2-5bcde+5c^2d^2\right) (ex+d)^{5+m}}{e^7 (5+m)} - \frac{3c^2(-be+2cd) (ex+d)^{6+m}}{e^7 (6+m)} + \frac{c^3(ex+d)^{7+m}}{e^7 (7+m)}$$

command

```
integrate((e*x+d)**m*(c*x**2+b*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.5 Problem number 656

$$\int \frac{\sqrt{-1+x}}{(1+x^2)^3} \, dx$$

Optimal antiderivative

$$\frac{x\sqrt{-1+x}}{4\left(x^{2}+1\right)^{2}}-\frac{(1-11x)\sqrt{-1+x}}{32\left(x^{2}+1\right)}-\frac{\arctan\left(\frac{-2\sqrt{-1+x}+\sqrt{-2+2\sqrt{2}}}{\sqrt{2+2\sqrt{2}}}\right)\sqrt{-1054+746\sqrt{2}}}{128}+\frac{\arctan\left(\frac{2\sqrt{-1+x}+\sqrt{-2+2\sqrt{2}}}{\sqrt{2+2\sqrt{2}}}\right)\sqrt{-1054+746\sqrt{2}}}{128}-\frac{\ln\left(1-x-\sqrt{2}-\sqrt{-1+x}\,\sqrt{-2+2\sqrt{2}}\right)\sqrt{1054+746\sqrt{2}}}{256}+\frac{\ln\left(1-x-\sqrt{2}+\sqrt{-1+x}\,\sqrt{-2+2\sqrt{2}}\right)\sqrt{1054+746\sqrt{2}}}{256}$$

command

```
integrate((-1+x)**(1/2)/(x**2+1)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.6 Problem number 721

$$\int (d+ex)^{m}\left(a+cx^{2}\right)^{3}\,dx$$

Optimal antiderivative

$$\frac{\left(a\,e^{2}+c\,d^{2}\right)^{3}(ex+d)^{1+m}}{e^{7}(1+m)}-\frac{6cd\left(a\,e^{2}+c\,d^{2}\right)^{2}(ex+d)^{2+m}}{e^{7}(2+m)}+\frac{3c\left(a\,e^{2}+c\,d^{2}\right)\left(a\,e^{2}+5c\,d^{2}\right)(ex+d)^{3+m}}{e^{7}(3+m)}-\frac{4c^{2}d\left(3a\,e^{2}+5c\,d^{2}\right)(ex+d)^{4+m}}{e^{7}(4+m)}+\frac{3c^{2}\left(a\,e^{2}+5c\,d^{2}\right)(ex+d)^{5+m}}{e^{7}(5+m)}-\frac{6c^{3}d(ex+d)^{6+m}}{e^{7}(6+m)}+\frac{c^{3}(ex+d)^{7+m}}{e^{7}(7+m)}$$

command

```
integrate((e*x+d)**m*(c*x**2+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.7 Problem number 1281

$$\int \frac{(a+bx+cx^2)^3}{(bd+2cdx)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{(-4ac+b^2)^3}{320c^4d\,(2cdx+bd)^{\frac{5}{2}}}-\frac{(-4ac+b^2)\,(2cdx+bd)^{\frac{3}{2}}}{64c^4d^5}+\frac{(2cdx+bd)^{\frac{7}{2}}}{448c^4d^7}-\frac{3(-4ac+b^2)^2}{64c^4d^3\sqrt{2cdx+bd}}$$

command

```
integrate((c*x**2+b*x+a)**3/(2*c*d*x+b*d)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{(4ac-b^2)^3}{320c^4d\,(bd+2cdx)^{\frac{5}{2}}}-\frac{3(4ac-b^2)^2}{64c^4d^3\sqrt{bd+2cdx}}+\frac{(12ac-3b^2)\,(bd+2cdx)^{\frac{3}{2}}}{192c^4d^5}+\frac{(bd+2cdx)^{\frac{7}{2}}}{448c^4d^7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.8 Problem number 1315

$$\int \frac{\sqrt{bd+2cdx}}{(a+bx+cx^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{(2cdx+bd)^{\frac{3}{2}}}{2\,(-4ac+b^2)\,d\,(c\,x^2+bx+a)^2}+\frac{5c(2cdx+bd)^{\frac{3}{2}}}{2\,(-4ac+b^2)^2\,d\,(c\,x^2+bx+a)}+\frac{5c^2\arctan\left(\frac{\sqrt{d\,(2cx+b)}}{(-4ac+b^2)^{\frac{1}{4}}\sqrt{d}}\right)\sqrt{d}}{(-4ac+b^2)^{\frac{9}{4}}}-\frac{5c^2\operatorname{arctanh}\left(\frac{\sqrt{d\,(2cx+b)}}{(-4ac+b^2)^{\frac{1}{4}}\sqrt{d}}\right)\sqrt{d}}{(-4ac+b^2)^{\frac{9}{4}}}$$

command

```
integrate((2*c*d*x+b*d)**(1/2)/(c*x**2+b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{230}{8192a^4c^4d^8 - 8192a^3b^2c^3d^8 + 4096a^3c^3d^6(bd+2cdx)^2 + 3072a^2b^4c^2d^8 - 3072a^2b^2c^2d^6(bd+2cdx)^2 + 512a^2c^2d^4(}$$
$$- \frac{5}{8192a^4c^4d^8 - 8192a^3b^2c^3d^8 + 4096a^3c^3d^6(bd+2cdx)^2 + 3072a^2b^4c^2d^8 - 3072a^2b^2c^2d^6(bd+2cdx)^2 + 512a^2c^2d^4}$$
$$+ \frac{3}{8192a^4c^4d^8 - 8192a^3b^2c^3d^8 + 4096a^3c^3d^6(bd+2cdx)^2 + 3072a^2b^4c^2d^8 - 3072a^2b^2c^2d^6(bd+2cdx)^2 + 512a^2c^2d^4}$$
$$+64c^2d^5 \operatorname{RootSum}\Big(t^4 \cdot (70368744177664a^9c^9d^{18} - 158329674399744a^8b^2c^8d^{18} + 158329674399744a^7b^4c^7d^{18} - 923$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.9 Problem number 1438

$$\int (bd+2cdx)^3 \left(a+bx+cx^2\right)^p \, dx$$

Optimal antiderivative

$$\frac{(-4ac+b^2)\,d^3(c\,x^2+bx+a)^{1+p}}{p^2+3p+2} + \frac{d^3(2cx+b)^2\,(c\,x^2+bx+a)^{1+p}}{2+p}$$

command

```
integrate((2*c*d*x+b*d)**3*(c*x**2+b*x+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{4acd^3\log\left(\frac{b}{2c}+x-\frac{\sqrt{-4ac+b^2}}{2c}\right)}{a+bx+cx^2} + \frac{4acd^3\log\left(\frac{b}{2c}+x+\frac{\sqrt{-4ac+b^2}}{2c}\right)}{a+bx+cx^2} + \frac{4acd^3}{a+bx+cx^2} - \frac{b^2d^3}{a+bx+cx^2} + \frac{4bcd^3x\log\left(\frac{b}{2c}+x-\frac{\sqrt{-4a}}{2}\right.}{a+bx+cx^2} \\ -4acd^3\log\left(\frac{b}{2c}+x-\frac{\sqrt{-4ac+b^2}}{2c}\right) - 4acd^3\log\left(\frac{b}{2c}+x+\frac{\sqrt{-4ac+b^2}}{2c}\right) + b^2d^3\log\left(\frac{b}{2c}+x-\frac{\sqrt{-4ac+b^2}}{2c}\right. \\ -\frac{4a^2cd^3(a+bx+cx^2)^p}{p^2+3p+2} + \frac{ab^2d^3p(a+bx+cx^2)^p}{p^2+3p+2} + \frac{2ab^2d^3(a+bx+cx^2)^p}{p^2+3p+2} + \frac{4abcd^3px(a+bx+cx^2)^p}{p^2+3p+2} + \frac{4ac^2d^3px^2(a+bx+cx^2)^p}{p^2+3p+2} + \frac{b^3d^3px(a}{p^2+} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.10 Problem number 1646

$$\int \frac{(d+ex)^{7/2}}{a^2+2abx+b^2x^2}\,dx$$

Optimal antiderivative

$$\frac{7e(-ae+bd)\,(ex+d)^{\frac{3}{2}}}{3b^3}+\frac{7e(ex+d)^{\frac{5}{2}}}{5b^2}-\frac{(ex+d)^{\frac{7}{2}}}{b\,(bx+a)}-\frac{7e(-ae+bd)^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{b^{\frac{9}{2}}}+\frac{7e(-ae+bd)^2\,\sqrt{ex+d}}{b^4}$$

command

```
integrate((e*x+d)**(7/2)/(b**2*x**2+2*a*b*x+a**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.11 Problem number 1647

$$\int \frac{(d+ex)^{5/2}}{a^2+2abx+b^2x^2}\,dx$$

Optimal antiderivative

$$\frac{5e(ex+d)^{\frac{3}{2}}}{3b^2}-\frac{(ex+d)^{\frac{5}{2}}}{b\,(bx+a)}-\frac{5e(-ae+bd)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{b^{\frac{7}{2}}}+\frac{5e(-ae+bd)\,\sqrt{ex+d}}{b^3}$$

command

```
integrate((e*x+d)**(5/2)/(b**2*x**2+2*a*b*x+a**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.12 Problem number 1648

$$\int \frac{(d+ex)^{3/2}}{a^2+2abx+b^2x^2}\,dx$$

Optimal antiderivative

$$-\frac{(ex+d)^{\frac{3}{2}}}{b\,(bx+a)}-\frac{3e\,\mathrm{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)\sqrt{-ae+bd}}{b^{\frac{5}{2}}}+\frac{3e\sqrt{ex+d}}{b^2}$$

command

```
integrate((e*x+d)**(3/2)/(b**2*x**2+2*a*b*x+a**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
\frac{2a^2e^3\sqrt{d+ex}}{2a^2b^2e^2-2ab^3de+2ab^3e^2x-2b^4dex}
$$

$$
-\frac{a^2e^3\sqrt{-\frac{1}{b(ae-bd)^3}}\log\left(-a^2e^2\sqrt{-\frac{1}{b(ae-bd)^3}}+2abde\sqrt{-\frac{1}{b(ae-bd)^3}}-b^2d^2\sqrt{-\frac{1}{b(ae-bd)^3}}+\sqrt{d+ex}\right)}{2b^2}
$$

$$
+\frac{a^2e^3\sqrt{-\frac{1}{b(ae-bd)^3}}\log\left(a^2e^2\sqrt{-\frac{1}{b(ae-bd)^3}}-2abde\sqrt{-\frac{1}{b(ae-bd)^3}}+b^2d^2\sqrt{-\frac{1}{b(ae-bd)^3}}+\sqrt{d+ex}\right)}{2b^2}
$$

$$
-\frac{4ade^2\sqrt{d+ex}}{2a^2be^2-2ab^2de+2ab^2e^2x-2b^3dex}
$$

$$
+\frac{ade^2\sqrt{-\frac{1}{b(ae-bd)^3}}\log\left(-a^2e^2\sqrt{-\frac{1}{b(ae-bd)^3}}+2abde\sqrt{-\frac{1}{b(ae-bd)^3}}-b^2d^2\sqrt{-\frac{1}{b(ae-bd)^3}}+\sqrt{d+ex}\right)}{b}
$$

$$
-\frac{ade^2\sqrt{-\frac{1}{b(ae-bd)^3}}\log\left(a^2e^2\sqrt{-\frac{1}{b(ae-bd)^3}}-2abde\sqrt{-\frac{1}{b(ae-bd)^3}}+b^2d^2\sqrt{-\frac{1}{b(ae-bd)^3}}+\sqrt{d+ex}\right)}{b}
$$

$$
-\frac{4ae^2\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{ae}{b}-d}}\right)}{b^3\sqrt{\frac{ae}{b}-d}}
$$

$$
-\frac{d^2e\sqrt{-\frac{1}{b(ae-bd)^3}}\log\left(-a^2e^2\sqrt{-\frac{1}{b(ae-bd)^3}}+2abde\sqrt{-\frac{1}{b(ae-bd)^3}}-b^2d^2\sqrt{-\frac{1}{b(ae-bd)^3}}+\sqrt{d+ex}\right)}{2}
$$

$$
+\frac{d^2e\sqrt{-\frac{1}{b(ae-bd)^3}}\log\left(a^2e^2\sqrt{-\frac{1}{b(ae-bd)^3}}-2abde\sqrt{-\frac{1}{b(ae-bd)^3}}+b^2d^2\sqrt{-\frac{1}{b(ae-bd)^3}}+\sqrt{d+ex}\right)}{2}
$$

$$
+\frac{2d^2e\sqrt{d+ex}}{2a^2e^2-2abde+2abe^2x-2b^2dex}+\frac{4de\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{ae}{b}-d}}\right)}{b^2\sqrt{\frac{ae}{b}-d}}+\frac{2e\sqrt{d+ex}}{b^2}
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.13 Problem number 1659

$$\int \frac{\sqrt{d+ex}}{\left(a^2+2abx+b^2x^2\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{e^3 \operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{8b^{\frac{3}{2}}\left(-ae+bd\right)^{\frac{5}{2}}}-\frac{\sqrt{ex+d}}{3b\left(bx+a\right)^3}-\frac{e\sqrt{ex+d}}{12b\left(-ae+bd\right)\left(bx+a\right)^2}+\frac{e^2\sqrt{ex+d}}{8b\left(-ae+bd\right)^2\left(bx+a\right)}$$

command

```
integrate((e*x+d)**(1/2)/(b**2*x**2+2*a*b*x+a**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.14 Problem number 1671

$$\int \frac{\sqrt{d+ex}}{\left(a^2+2abx+b^2x^2\right)^3}\,dx$$

Optimal antiderivative

$$-\frac{7e^5 \operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{128b^{\frac{3}{2}}\left(-ae+bd\right)^{\frac{9}{2}}}-\frac{\sqrt{ex+d}}{5b\left(bx+a\right)^5}-\frac{e\sqrt{ex+d}}{40b\left(-ae+bd\right)\left(bx+a\right)^4}+\frac{7e^2\sqrt{ex+d}}{240b\left(-ae+bd\right)^2\left(bx+a\right)^3}-\frac{7e^3\sqrt{ex+d}}{192b\left(-ae+bd\right)^3\left(bx+a\right)^2}+\frac{7e^4\sqrt{ex+d}}{128b\left(-ae+bd\right)^4\left(bx+a\right)}$$

command

```
integrate((e*x+d)**(1/2)/(b**2*x**2+2*a*b*x+a**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.15 Problem number 1731

$$\int (d+ex)^m \left(a^2+2abx+b^2x^2\right)^3 \, dx$$

Optimal antiderivative

$$\frac{(-ae+bd)^6 (ex+d)^{1+m}}{e^7 (1+m)} - \frac{6b(-ae+bd)^5 (ex+d)^{2+m}}{e^7 (2+m)} + \frac{15b^2(-ae+bd)^4 (ex+d)^{3+m}}{e^7 (3+m)} - \frac{20b^3(-ae+bd)^3 (ex+d)^{4+m}}{e^7 (4+m)} + \frac{15b^4(-ae+bd)^2 (ex+d)^{5+m}}{e^7 (5+m)} - \frac{6b^5(-ae+bd) (ex+d)^{6+m}}{e^7 (6+m)} + \frac{b^6(ex+d)^{7+m}}{e^7 (7+m)}$$

command

```
integrate((e*x+d)**m*(b**2*x**2+2*a*b*x+a**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.16 Problem number 1993

$$\int \frac{\left(ade+\left(cd^2+ae^2\right)x+cdex^2\right)^3}{\sqrt{d+ex}} \, dx$$

Optimal antiderivative

$$-\frac{2\left(-a\,e^2+c\,d^2\right)^3 (ex+d)^{\frac{7}{2}}}{7e^4} + \frac{2cd\left(-a\,e^2+c\,d^2\right)^2 (ex+d)^{\frac{9}{2}}}{3e^4} - \frac{6c^2d^2\left(-a\,e^2+c\,d^2\right) (ex+d)^{\frac{11}{2}}}{11e^4} + \frac{2c^3d^3(ex+d)^{\frac{13}{2}}}{13e^4}$$

command

```
integrate((a*d*e+(a*e**2+c*d**2)*x+c*d*e*x**2)**3/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.17 Problem number 1996

$$\int \frac{\left(ade + \left(cd^2 + ae^2\right)x + cdex^2\right)^3}{(d + ex)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2cd\left(-a\,e^2 + c\,d^2\right)^2 (ex + d)^{\frac{3}{2}}}{e^4} - \frac{6c^2d^2\left(-a\,e^2 + c\,d^2\right)(ex + d)^{\frac{5}{2}}}{5e^4} + \frac{2c^3d^3(ex + d)^{\frac{7}{2}}}{7e^4} - \frac{2\left(-a\,e^2 + c\,d^2\right)^3\sqrt{ex + d}}{e^4}$$

command

```
integrate((a*d*e+(a*e**2+c*d**2)*x+c*d*e*x**2)**3/(e*x+d)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2a^3de^3}{\sqrt{d+ex}} - 2a^3e^3\left(-\frac{d}{\sqrt{d+ex}} - \sqrt{d+ex}\right) - 6a^2cd^2e\left(-\frac{d}{\sqrt{d+ex}} - \sqrt{d+ex}\right) - 6a^2cde\left(\frac{d^2}{\sqrt{d+ex}} + 2d\sqrt{d+ex} - \frac{(d+ex)}{3}\right. \\ \frac{c^3d^{\frac{5}{2}}x^4}{4} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.18 Problem number 2001

$$\int \frac{(d + ex)^{7/2}}{ade + \left(cd^2 + ae^2\right)x + cdex^2}\,dx$$

Optimal antiderivative

$$\frac{2\left(-a\,e^2 + c\,d^2\right)(ex + d)^{\frac{3}{2}}}{3c^2d^2} + \frac{2(ex + d)^{\frac{5}{2}}}{5cd} - \frac{2\left(-a\,e^2 + c\,d^2\right)^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{c}\,\sqrt{d}\,\sqrt{ex + d}}{\sqrt{-a\,e^2 + c\,d^2}}\right)}{c^{\frac{7}{2}}d^{\frac{7}{2}}} + \frac{2\left(-a\,e^2 + c\,d^2\right)^2\sqrt{ex + d}}{c^3d^3}$$

command

```
integrate((e*x+d)**(7/2)/(a*d*e+(a*e**2+c*d**2)*x+c*d*e*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2(d+ex)^{\frac{5}{2}}}{5cd}+\frac{(d+ex)^{\frac{3}{2}}\left(-2ae^2+2cd^2\right)}{3c^2d^2}+\frac{\sqrt{d+ex}\left(2a^2e^4-4acd^2e^2+2c^2d^4\right)}{c^3d^3}-\frac{2\left(ae^2-cd^2\right)^3\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{ae^2-cd^2}{cd}}}\right)}{c^4d^4\sqrt{\frac{ae^2-cd^2}{cd}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.19 Problem number 2288

$$\int\frac{\left(a+bx+cx^2\right)^3}{(d+ex)^{7/2}}\,dx$$

Optimal antiderivative

$$-\frac{2\left(a\,e^2-bde+c\,d^2\right)^3}{5e^7\,(ex+d)^{\frac{5}{2}}}+\frac{2(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)^2}{e^7\,(ex+d)^{\frac{3}{2}}}+\frac{2c\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)(ex+d)^{\frac{3}{2}}}{e^7}-\frac{6c^2(-be+2cd)\,(ex+d)^{\frac{5}{2}}}{5e^7}+\frac{2c^3(ex+d)^{\frac{7}{2}}}{7e^7}-\frac{6\left(a\,e^2-bde+c\,d^2\right)\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)}{e^7\sqrt{ex+d}}-\frac{2(-be+2cd)\left(10c^2d^2+b^2e^2-2ce(-3ae+5bd)\right)\sqrt{ex+d}}{e^7}$$

command

```
integrate((c*x**2+b*x+a)**3/(e*x+d)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2c^3(d+ex)^{\frac{7}{2}}}{7e^7}+\frac{(d+ex)^{\frac{5}{2}}\cdot\left(6bc^2e-12c^3d\right)}{5e^7}+\frac{(d+ex)^{\frac{3}{2}}\cdot\left(6ac^2e^2+6b^2ce^2-30bc^2de+30c^3d^2\right)}{3e^7}+\frac{\sqrt{d+ex}\left(12abce^3-24ac^2de^2+2b^3e^3-24b^2cde^2+60bc^2d^2e-40c^3d^3\right)}{e^7}-\frac{6\left(ae^2-bde+cd^2\right)\left(ace^2+b^2e^2-5bcde+5c^2d^2\right)}{e^7\sqrt{d+ex}}-\frac{2(be-2cd)\left(ae^2-bde+cd^2\right)^2}{e^7\,(d+ex)^{\frac{3}{2}}}-\frac{2\left(ae^2-bde+cd^2\right)^3}{5e^7\,(d+ex)^{\frac{5}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.20 Problem number 2316

$$\int \frac{(1+2x)^{7/2}}{(2+3x+5x^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{8(1+2x)^{\frac{3}{2}}}{155}-\frac{(5-4x)\,(1+2x)^{\frac{5}{2}}}{31\,(5x^2+3x+2)}+\frac{604\sqrt{1+2x}}{775}$$
$$+\frac{\arctan\left(\frac{-10\sqrt{1+2x}+\sqrt{20+10\sqrt{35}}}{\sqrt{-20+10\sqrt{35}}}\right)\sqrt{-1761642580+300382250\sqrt{35}}}{120125}$$
$$-\frac{\arctan\left(\frac{10\sqrt{1+2x}+\sqrt{20+10\sqrt{35}}}{\sqrt{-20+10\sqrt{35}}}\right)\sqrt{-1761642580+300382250\sqrt{35}}}{120125}$$
$$+\frac{\ln\left(5+10x+\sqrt{35}-\sqrt{1+2x}\,\sqrt{20+10\sqrt{35}}\right)\sqrt{1761642580+300382250\sqrt{35}}}{240250}$$
$$-\frac{\ln\left(5+10x+\sqrt{35}+\sqrt{1+2x}\,\sqrt{20+10\sqrt{35}}\right)\sqrt{1761642580+300382250\sqrt{35}}}{240250}$$

command

```
integrate((1+2*x)**(7/2)/(5*x**2+3*x+2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$- \frac{17280(2x+1)^{\frac{3}{2}}}{-124000x + 77500\,(2x+1)^2 + 46500} + \frac{21280(2x+1)^{\frac{3}{2}}}{-868000x + 542500\,(2x+1)^2 + 325500}$$
$$+ \frac{16\sqrt{2x+1}}{25} + \frac{6912\sqrt{2x+1}}{-124000x + 77500\,(2x+1)^2 + 46500} + \frac{57456\sqrt{2x+1}}{-868000x + 542500\,(2x+1)^2 + 325500}$$
$$+16\,\mathrm{RootSum}\left(407144088666112t^4 + 3325152256t^2 + 11045, \left(t \mapsto t\log\left(\frac{33312534528t^3}{235} + \frac{166784t}{235} + \sqrt{2x+1}\right)\right.\right.$$
$$- \frac{1632\,\mathrm{RootSum}\left(407144088666112t^4 + 3325152256t^2 + 11045, \left(t \mapsto t\log\left(\frac{33312534528t^3}{235} + \frac{166784t}{235} + \sqrt{2x+1}\right)\right)\right)}{25}$$
$$- \frac{624\,\mathrm{RootSum}\left(1722112t^4 + 1984t^2 + 5, \left(t \mapsto t\log\left(-\frac{27776t^3}{5} + \frac{108t}{5} + \sqrt{2x+1}\right)\right)\right)}{125}$$
$$- \frac{336\,\mathrm{RootSum}\left(19950060344639488t^4 + 498437272576t^2 + 10878125, \left(t \mapsto t\log\left(-\frac{110495114452672t^3}{2205125} + \frac{3079182256t}{2205125} + \right.\right.\right.}{5}$$
$$- \frac{288\,\mathrm{RootSum}\left(1722112t^4 + 1984t^2 + 5, \left(t \mapsto t\log\left(-\frac{27776t^3}{5} + \frac{108t}{5} + \sqrt{2x+1}\right)\right)\right)}{25}$$
$$- \frac{112\,\mathrm{RootSum}\left(1230080t^4 + 1984t^2 + 7, \left(t \mapsto t\log\left(9920t^3 + 8t + \sqrt{2x+1}\right)\right)\right)}{25}$$
$$- \frac{48\,\mathrm{RootSum}\left(407144088666112t^4 + 3325152256t^2 + 11045, \left(t \mapsto t\log\left(\frac{33312534528t^3}{235} + \frac{166784t}{235} + \sqrt{2x+1}\right)\right)\right)}{5}$$
$$+ \frac{48\,\mathrm{RootSum}\left(1722112t^4 + 1984t^2 + 5, \left(t \mapsto t\log\left(-\frac{27776t^3}{5} + \frac{108t}{5} + \sqrt{2x+1}\right)\right)\right)}{5}$$
$$+ \frac{48\,\mathrm{RootSum}\left(1230080t^4 + 1984t^2 + 7, \left(t \mapsto t\log\left(9920t^3 + 8t + \sqrt{2x+1}\right)\right)\right)}{5}$$
$$+ \frac{448\,\mathrm{RootSum}\left(19950060344639488t^4 + 498437272576t^2 + 10878125, \left(t \mapsto t\log\left(-\frac{110495114452672t^3}{2205125} + \frac{3079182256t}{2205125} + \right.\right.\right.}{125}$$
$$+ \frac{2016\,\mathrm{RootSum}\left(19950060344639488t^4 + 498437272576t^2 + 10878125, \left(t \mapsto t\log\left(-\frac{110495114452672t^3}{2205125} + \frac{3079182256t}{2205125} + \right.\right.\right.}{25}$$
$$+ \frac{3904\,\mathrm{RootSum}\left(407144088666112t^4 + 3325152256t^2 + 11045, \left(t \mapsto t\log\left(\frac{33312534528t^3}{235} + \frac{166784t}{235} + \sqrt{2x+1}\right)\right)\right)}{125}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.21 Problem number 2317

$$\int \frac{(1+2x)^{5/2}}{(2+3x+5x^2)^2}\,dx$$

Optimal antiderivative

$$
\begin{aligned}
&-\frac{(5-4x)\,(1+2x)^{\frac{3}{2}}}{31\,(5x^2+3x+2)}-\frac{8\sqrt{1+2x}}{155}\\
&+\frac{\ln\left(5+10x+\sqrt{35}-\sqrt{1+2x}\,\sqrt{20+10\sqrt{35}}\right)\sqrt{-10130180+3200750\sqrt{35}}}{48050}\\
&-\frac{\ln\left(5+10x+\sqrt{35}+\sqrt{1+2x}\,\sqrt{20+10\sqrt{35}}\right)\sqrt{-10130180+3200750\sqrt{35}}}{48050}\\
&-\frac{\arctan\left(\frac{-10\sqrt{1+2x}+\sqrt{20+10\sqrt{35}}}{\sqrt{-20+10\sqrt{35}}}\right)\sqrt{10130180+3200750\sqrt{35}}}{24025}\\
&+\frac{\arctan\left(\frac{10\sqrt{1+2x}+\sqrt{20+10\sqrt{35}}}{\sqrt{-20+10\sqrt{35}}}\right)\sqrt{10130180+3200750\sqrt{35}}}{24025}
\end{aligned}
$$

command

```
integrate((1+2*x)**(5/2)/(5*x**2+3*x+2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{1520(2x+1)^{\frac{3}{2}}}{-24800x+15500(2x+1)^2+9300}-\frac{4480(2x+1)^{\frac{3}{2}}}{-173600x+108500(2x+1)^2+65100}$$
$$+\frac{608\sqrt{2x+1}}{-24800x+15500(2x+1)^2+9300}-\frac{12096\sqrt{2x+1}}{-173600x+108500(2x+1)^2+65100}$$
$$+16\,\mathrm{RootSum}\left(407144088666112t^4+3325152256t^2+11045,\left(t\mapsto t\log\left(\frac{33312534528t^3}{235}+\frac{166784t}{235}+\sqrt{2x+1}\right)\right.\right.$$
$$-\frac{544\,\mathrm{RootSum}\left(407144088666112t^4+3325152256t^2+11045,\left(t\mapsto t\log\left(\frac{33312534528t^3}{235}+\frac{166784t}{235}+\sqrt{2x+1}\right)\right)\right)}{25}$$
$$-\frac{224\,\mathrm{RootSum}\left(19950060344639488t^4+498437272576t^2+10878125,\left(t\mapsto t\log\left(-\frac{11049511452672t^3}{2205125}+\frac{307918256t}{2205125}+\right.\right.\right.}{5}$$
$$-\frac{96\,\mathrm{RootSum}\left(1722112t^4+1984t^2+5,\left(t\mapsto t\log\left(-\frac{27776t^3}{5}+\frac{108t}{5}+\sqrt{2x+1}\right)\right)\right)}{25}$$
$$-\frac{32\,\mathrm{RootSum}\left(407144088666112t^4+3325152256t^2+11045,\left(t\mapsto t\log\left(\frac{33312534528t^3}{235}+\frac{166784t}{235}+\sqrt{2x+1}\right)\right)\right)}{5}$$
$$+\frac{16\,\mathrm{RootSum}\left(1230080t^4+1984t^2+7,\left(t\mapsto t\log\left(9920t^3+8t+\sqrt{2x+1}\right)\right)\right)}{5}$$
$$+\frac{32\,\mathrm{RootSum}\left(1722112t^4+1984t^2+5,\left(t\mapsto t\log\left(-\frac{27776t^3}{5}+\frac{108t}{5}+\sqrt{2x+1}\right)\right)\right)}{5}$$
$$+\frac{672\,\mathrm{RootSum}\left(19950060344639488t^4+498437272576t^2+10878125,\left(t\mapsto t\log\left(-\frac{11049511452672t^3}{2205125}+\frac{307918256t}{2205125}+\right.\right.\right.}{25}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

21.22 Problem number 2325

$$\int\frac{(1+2x)^{5/2}}{(2+3x+5x^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{(5-4x)(1+2x)^{\frac{3}{2}}}{62(5x^2+3x+2)^2}+\frac{3(11+78x)\sqrt{1+2x}}{1922(5x^2+3x+2)}$$
$$+\frac{3\ln\left(5+10x+\sqrt{35}-\sqrt{1+2x}\,\sqrt{20+10\sqrt{35}}\right)\sqrt{-4675420+838550\sqrt{35}}}{595820}$$
$$-\frac{3\ln\left(5+10x+\sqrt{35}+\sqrt{1+2x}\,\sqrt{20+10\sqrt{35}}\right)\sqrt{-4675420+838550\sqrt{35}}}{595820}$$
$$-\frac{3\arctan\left(\frac{-10\sqrt{1+2x}+\sqrt{20+10\sqrt{35}}}{\sqrt{-20+10\sqrt{35}}}\right)\sqrt{4675420+838550\sqrt{35}}}{297910}$$
$$+\frac{3\arctan\left(\frac{10\sqrt{1+2x}+\sqrt{20+10\sqrt{35}}}{\sqrt{-20+10\sqrt{35}}}\right)\sqrt{4675420+838550\sqrt{35}}}{297910}$$

command

```
integrate((1+2*x)**(5/2)/(5*x**2+3*x+2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.23 Problem number 2549

$$\int (d+ex)^m \left(a+bx+cx^2\right)^4 \, dx$$

Optimal antiderivative

$$\frac{\left(a\,e^2-bde+c\,d^2\right)^4(ex+d)^{1+m}}{e^9\,(1+m)}-\frac{4(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)^3(ex+d)^{2+m}}{e^9\,(2+m)}$$
$$+\frac{2\left(a\,e^2-bde+c\,d^2\right)^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{3+m}}{e^9\,(3+m)}$$
$$-\frac{4(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{4+m}}{e^9\,(4+m)}$$
$$+\frac{\left(70c^4d^4+b^4e^4-4b^2c\,e^3(-3ae+5bd)-20c^3d^2e(-3ae+7bd)+6c^2e^2\left(a^2e^2-10abde+15b^2d^2\right)\right)(ex+d)^{5+m}}{e^9\,(5+m)}$$
$$-\frac{4c(-be+2cd)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{6+m}}{e^9\,(6+m)}$$
$$+\frac{2c^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{7+m}}{e^9\,(7+m)}$$
$$-\frac{4c^3(-be+2cd)\,(ex+d)^{8+m}}{e^9\,(8+m)}+\frac{c^4(ex+d)^{9+m}}{e^9\,(9+m)}$$

command

```
integrate((e*x+d)**m*(c*x**2+b*x+a)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

21.24 Problem number 2550

$$\int (d+ex)^m\left(a+bx+cx^2\right)^3\,dx$$

Optimal antiderivative

$$\frac{\left(a\,e^2-bde+c\,d^2\right)^3(ex+d)^{1+m}}{e^7\,(1+m)}-\frac{3(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)^2(ex+d)^{2+m}}{e^7\,(2+m)}$$
$$+\frac{3\left(a\,e^2-bde+c\,d^2\right)\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)(ex+d)^{3+m}}{e^7\,(3+m)}$$
$$-\frac{(-be+2cd)\left(10c^2d^2+b^2e^2-2ce(-3ae+5bd)\right)(ex+d)^{4+m}}{e^7\,(4+m)}$$
$$+\frac{3c\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)(ex+d)^{5+m}}{e^7\,(5+m)}$$
$$-\frac{3c^2(-be+2cd)\,(ex+d)^{6+m}}{e^7\,(6+m)}+\frac{c^3(ex+d)^{7+m}}{e^7\,(7+m)}$$

command

```
integrate((e*x+d)**m*(c*x**2+b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22 Test file number 34

Test folder name:

```
test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.1_Quadratic/34_1.2.1.3-
d+e_x-^m-f+g_x-a+b_x+c_x^2-^p
```

22.1 Problem number 178

$$\int \frac{x^{7/2}(A+Bx)}{\left(bx+cx^2\right)^2}\,dx$$

Optimal antiderivative

$$\frac{(-3Ac+5bB)\,x^{\frac{3}{2}}}{3b\,c^2}-\frac{(-Ac+bB)\,x^{\frac{5}{2}}}{bc\,(cx+b)}+\frac{(-3Ac+5bB)\arctan\left(\frac{\sqrt{c}\,\sqrt{x}}{\sqrt{b}}\right)\sqrt{b}}{c^{\frac{7}{2}}}-\frac{(-3Ac+5bB)\,\sqrt{x}}{c^3}$$

command

```
integrate(x**(7/2)*(B*x+A)/(c*x**2+b*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(2A\sqrt{x}+\frac{2Bx^{\frac{3}{2}}}{3}\right) \\ \frac{\frac{2Ax^{\frac{5}{2}}}{5}+\frac{2Bx^{\frac{7}{2}}}{7}}{b^2} \\ \frac{2A\sqrt{x}+\frac{2Bx^{\frac{3}{2}}}{3}}{c^2} \\ -\frac{9Ab^2c\log\left(\sqrt{x}-\sqrt{-\frac{b}{c}}\right)}{6bc^4\sqrt{-\frac{b}{c}}+6c^5x\sqrt{-\frac{b}{c}}}+\frac{9Ab^2c\log\left(\sqrt{x}+\sqrt{-\frac{b}{c}}\right)}{6bc^4\sqrt{-\frac{b}{c}}+6c^5x\sqrt{-\frac{b}{c}}}+\frac{18Abc^2\sqrt{x}\,\sqrt{-\frac{b}{c}}}{6bc^4\sqrt{-\frac{b}{c}}+6c^5x\sqrt{-\frac{b}{c}}}-\frac{9Abc^2x\log\left(\sqrt{x}-\sqrt{-\frac{b}{c}}\right)}{6bc^4\sqrt{-\frac{b}{c}}+6c^5x\sqrt{-\frac{b}{c}}}+\frac{9Abc^2x\,\mathrm{lo}}{6bc^4\sqrt{}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.2 Problem number 184

$$\int \frac{A+Bx}{x^{5/2}\left(bx+cx^2\right)^2}\,dx$$

Optimal antiderivative

$$\frac{-9Ac+7bB}{7b^2c\,x^{\frac{7}{2}}}+\frac{9Ac-7bB}{5b^3x^{\frac{5}{2}}}+\frac{c(-9Ac+7bB)}{3b^4x^{\frac{3}{2}}}+\frac{Ac-bB}{bc\,x^{\frac{7}{2}}\,(cx+b)}-\frac{c^{\frac{5}{2}}(-9Ac+7bB)\arctan\left(\frac{\sqrt{c}\,\sqrt{x}}{\sqrt{b}}\right)}{b^{\frac{11}{2}}}-\frac{c^2(-9Ac+7bB)}{b^5\sqrt{x}}$$

command

```
integrate((B*x+A)/x**(5/2)/(c*x**2+b*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.3 Problem number 190

$$\int \frac{x^{3/2}(A+Bx)}{\left(bx+cx^2\right)^3}\,dx$$

Optimal antiderivative

$$\frac{3(-5Ac+bB)\arctan\left(\frac{\sqrt{c}\,\sqrt{x}}{\sqrt{b}}\right)}{4b^{\frac{7}{2}}\sqrt{c}}+\frac{-\frac{15Ac}{4}+\frac{3bB}{4}}{b^3c\sqrt{x}}+\frac{Ac-bB}{2bc\,(cx+b)^2\sqrt{x}}+\frac{5Ac-bB}{4b^2c\,(cx+b)\sqrt{x}}$$

command

```
integrate(x**(3/2)*(B*x+A)/(c*x**2+b*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.4 Problem number 192

$$\int \frac{A+Bx}{\sqrt{x}\,(bx+cx^2)^3}\,dx$$

Optimal antiderivative

$$\frac{-\frac{63Ac}{20}+\frac{7bB}{4}}{b^3c\,x^{\frac{5}{2}}}-\frac{7(-9Ac+5bB)}{12b^4x^{\frac{3}{2}}}+\frac{Ac-bB}{2bc\,x^{\frac{5}{2}}\,(cx+b)^2}+\frac{9Ac-5bB}{4b^2c\,x^{\frac{5}{2}}\,(cx+b)}+\frac{7c^{\frac{3}{2}}(-9Ac+5bB)\arctan\left(\frac{\sqrt{c}\,\sqrt{x}}{\sqrt{b}}\right)}{4b^{\frac{11}{2}}}+\frac{7c(-9Ac+5bB)}{4b^5\sqrt{x}}$$

command

```
integrate((B*x+A)/(c*x**2+b*x)**3/x**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.5 Problem number 419

$$\int \frac{A+Bx}{x^{9/2}\,(a+cx^2)}\,dx$$

Optimal antiderivative

$$-\frac{2A}{7a\,x^{\frac{7}{2}}}-\frac{2B}{5a\,x^{\frac{5}{2}}}+\frac{2Ac}{3a^2x^{\frac{3}{2}}}+\frac{c^{\frac{5}{4}}\ln\left(\sqrt{a}+x\sqrt{c}-a^{\frac{1}{4}}c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\left(B\sqrt{a}-A\sqrt{c}\right)\sqrt{2}}{4a^{\frac{11}{4}}}-\frac{c^{\frac{5}{4}}\ln\left(\sqrt{a}+x\sqrt{c}+a^{\frac{1}{4}}c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\left(B\sqrt{a}-A\sqrt{c}\right)\sqrt{2}}{4a^{\frac{11}{4}}}-\frac{c^{\frac{5}{4}}\arctan\left(1-\frac{c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\left(B\sqrt{a}+A\sqrt{c}\right)\sqrt{2}}{2a^{\frac{11}{4}}}+\frac{c^{\frac{5}{4}}\arctan\left(1+\frac{c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{a^{\frac{1}{4}}}\right)\left(B\sqrt{a}+A\sqrt{c}\right)\sqrt{2}}{2a^{\frac{11}{4}}}+\frac{2Bc}{a^2\sqrt{x}}$$

command

```
integrate((B*x+A)/x**(9/2)/(c*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{9x^{\frac{9}{2}}}\right) \\ \frac{-\frac{2A}{11x^{\frac{11}{2}}}-\frac{2B}{9x^{\frac{9}{2}}}}{c} \\ \frac{-\frac{2A}{7x^{\frac{7}{2}}}-\frac{2B}{5x^{\frac{5}{2}}}}{a} \\ -\frac{2A}{7ax^{\frac{7}{2}}}+\frac{2Ac}{3a^2x^{\frac{3}{2}}}-\frac{Ac^2\sqrt[4]{-\frac{a}{c}}\log\left(\sqrt{x}-\sqrt[4]{-\frac{a}{c}}\right)}{2a^3}+\frac{Ac^2\sqrt[4]{-\frac{a}{c}}\log\left(\sqrt{x}+\sqrt[4]{-\frac{a}{c}}\right)}{2a^3}+\frac{Ac^2\sqrt[4]{-\frac{a}{c}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{a}{c}}}\right)}{a^3}-\frac{2B}{5ax^{\frac{5}{2}}}+ \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.6 Problem number 466

$$\int \frac{(ex)^{7/2}(A+Bx)}{(a+cx^2)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{e(ex)^{\frac{5}{2}}(Bx+A)}{c\sqrt{cx^2+a}}+\frac{7Be^2(ex)^{\frac{3}{2}}\sqrt{cx^2+a}}{5c^2}-\frac{21aBe^4x\sqrt{cx^2+a}}{5c^{\frac{5}{2}}\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{ex}}+\frac{5Ae^3\sqrt{ex}\sqrt{cx^2+a}}{3c^2}$$

$$+\frac{21a^{\frac{5}{4}}Be^4\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticE}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{x}\ \sqrt{}}{5\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)c^{\frac{11}{4}}\sqrt{ex}\ \sqrt{cx^2+a}}$$

$$-\frac{a^{\frac{3}{4}}e^4\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(63B\sqrt{a}+25A\sqrt{c}\right)\left(\sqrt{a}\right.}{30\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)c^{\frac{11}{4}}\sqrt{ex}\ \sqrt{cx^2+a}}$$

command

```
integrate((e*x)**(7/2)*(B*x+A)/(c*x**2+a)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{7}{2}}x^{\frac{9}{2}}\Gamma\left(\frac{9}{4}\right){}_{2}F_{1}\left(\begin{matrix}\frac{3}{2},\frac{9}{4}\\\frac{13}{4}\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2a^{\frac{3}{2}}\Gamma\left(\frac{13}{4}\right)}+\frac{Be^{\frac{7}{2}}x^{\frac{11}{2}}\Gamma\left(\frac{11}{4}\right){}_{2}F_{1}\left(\begin{matrix}\frac{3}{2},\frac{11}{4}\\\frac{15}{4}\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2a^{\frac{3}{2}}\Gamma\left(\frac{15}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.7 Problem number 478

$$\int\frac{(ex)^{5/2}(A+Bx)}{(a+cx^{2})^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{e(ex)^{\frac{3}{2}}(Bx+A)}{3c\,(c\,x^{2}+a)^{\frac{3}{2}}}-\frac{e^{2}(-3Acx+5Ba)\sqrt{ex}}{6a\,c^{2}\sqrt{c\,x^{2}+a}}-\frac{A\,e^{3}x\sqrt{c\,x^{2}+a}}{2a\,c^{\frac{3}{2}}\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{ex}}$$
$$+\frac{A\,e^{3}\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticE}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{x}\ \sqrt{\frac{c\,x}{(\sqrt{a}\,\cdots}}}{2\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{3}{4}}c^{\frac{7}{4}}\sqrt{ex}\ \sqrt{c\,x^{2}+a}}$$
$$+\frac{e^{3}\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(5B\sqrt{a}-3A\sqrt{c}\right)\left(\sqrt{a}+x\sqrt{\cdots}\right.}{12\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{3}{4}}c^{\frac{9}{4}}\sqrt{ex}\ \sqrt{c\,x^{2}+a}}$$

command

```
integrate((e*x)**(5/2)*(B*x+A)/(c*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{5}{2}}x^{\frac{7}{2}}\Gamma\left(\frac{7}{4}\right){}_{2}F_{1}\left(\begin{matrix}\frac{7}{4},\frac{5}{2}\\\frac{11}{4}\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{11}{4}\right)}+\frac{Be^{\frac{5}{2}}x^{\frac{9}{2}}\Gamma\left(\frac{9}{4}\right){}_{2}F_{1}\left(\begin{matrix}\frac{9}{4},\frac{5}{2}\\\frac{13}{4}\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{13}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.8 Problem number 479

$$\int \frac{(ex)^{3/2}(A+Bx)}{(a+cx^2)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{e(Bx+A)\sqrt{ex}}{3c\,(c\,x^2+a)^{\frac{3}{2}}}+\frac{e(3Bx+A)\sqrt{ex}}{6ac\sqrt{c\,x^2+a}}-\frac{B\,e^2x\sqrt{c\,x^2+a}}{2a\,c^{\frac{3}{2}}\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{ex}}$$

$$+\frac{B\,e^2\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticE}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{x}\ \sqrt{\frac{c\,x\cdots}{\left(\sqrt{a}\cdots\right.}}}{2\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{3}{4}}c^{\frac{7}{4}}\sqrt{ex}\ \sqrt{c\,x^2+a}}$$

$$-\frac{e^2\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(3B\sqrt{a}-A\sqrt{c}\right)\left(\sqrt{a}+x\sqrt{\cdots}\right.}{12\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{5}{4}}c^{\frac{7}{4}}\sqrt{ex}\ \sqrt{c\,x^2+a}}$$

command

```
integrate((e*x)**(3/2)*(B*x+A)/(c*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Ae^{\frac{3}{2}}x^{\frac{5}{2}}\Gamma\left(\frac{5}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{5}{4},\frac{5}{2}\\ \frac{9}{4}\end{matrix}\right|\frac{cx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{9}{4}\right)}+\frac{Be^{\frac{3}{2}}x^{\frac{7}{2}}\Gamma\left(\frac{7}{4}\right){}_2F_1\left(\left.\begin{matrix}\frac{7}{4},\frac{5}{2}\\ \frac{11}{4}\end{matrix}\right|\frac{cx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}\Gamma\left(\frac{11}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.9 Problem number 482

$$\int \frac{A+Bx}{(ex)^{3/2}\,(a+cx^2)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{Bx+A}{3ae\left(cx^2+a\right)^{\frac{3}{2}}\sqrt{ex}}+\frac{5Bx+7A}{6a^2e\sqrt{ex}\,\sqrt{cx^2+a}}-\frac{7A\sqrt{cx^2+a}}{2a^3e\sqrt{ex}}+\frac{7Ax\sqrt{c}\,\sqrt{cx^2+a}}{2a^3e\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{ex}}$$

$$-\frac{7A\,c^{\frac{1}{4}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticE}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(\sqrt{a}+x\sqrt{c}\right)\sqrt{x}\ \sqrt{\frac{c}{(\sqrt{a}}}}{2\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{11}{4}}e\sqrt{ex}\,\sqrt{cx^2+a}}$$

$$+\frac{\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)\left(5B\sqrt{a}+21A\sqrt{c}\right)\left(\sqrt{a}+x\sqrt{c}\right.}{12\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{11}{4}}c^{\frac{1}{4}}e\sqrt{ex}\,\sqrt{cx^2+a}}$$

command

```
integrate((B*x+A)/(e*x)**(3/2)/(c*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{1}{4}\right){}_2F_1\left(\begin{matrix}-\frac{1}{4},\frac{5}{2}\\ \frac{3}{4}\end{matrix}\middle|\frac{cx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{3}{2}}\sqrt{x}\,\Gamma\left(\frac{3}{4}\right)}+\frac{B\sqrt{x}\,\Gamma\left(\frac{1}{4}\right){}_2F_1\left(\begin{matrix}\frac{1}{4},\frac{5}{2}\\ \frac{5}{4}\end{matrix}\middle|\frac{cx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{3}{2}}\Gamma\left(\frac{5}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.10 Problem number 483

$$\int\frac{A+Bx}{(ex)^{5/2}\,(a+cx^2)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{Bx+A}{3ae\,(ex)^{\frac{3}{2}}\,(c\,x^2+a)^{\frac{3}{2}}}+\frac{7Bx+9A}{6a^2e\,(ex)^{\frac{3}{2}}\,\sqrt{c\,x^2+a}}-\frac{5A\sqrt{c\,x^2+a}}{2a^3e\,(ex)^{\frac{3}{2}}}-\frac{7B\sqrt{c\,x^2+a}}{2a^3e^2\sqrt{ex}}+\frac{7Bx\sqrt{c}\,\sqrt{c\,x^2+a}}{2a^3e^2\,(\sqrt{a}+x\sqrt{c})\,\sqrt{ex}}-\frac{7B\,c^{\frac{1}{4}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticE}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)(\sqrt{a}+x\sqrt{c})\,\sqrt{x}\,\sqrt{\frac{c}{(\sqrt{a}}}}{2\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{11}{4}}e^2\sqrt{ex}\,\sqrt{c\,x^2+a}}+\frac{c^{\frac{1}{4}}\sqrt{\frac{\cos\left(4\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)}{2}+\frac{1}{2}}\ \mathrm{EllipticF}\left(\sin\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right),\frac{\sqrt{2}}{2}\right)(7B\sqrt{a}-5A\sqrt{c})\,(\sqrt{a}+x\sqrt{}}{4\cos\left(2\arctan\left(\frac{c^{\frac{1}{4}}\sqrt{x}}{a^{\frac{1}{4}}}\right)\right)a^{\frac{13}{4}}e^2\sqrt{ex}\,\sqrt{c\,x^2+a}}$$

command

```
integrate((B*x+A)/(e*x)**(5/2)/(c*x**2+a)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{A\Gamma\left(-\frac{3}{4}\right)\,{}_2F_1\left(\begin{matrix}-\frac{3}{4},\frac{5}{2}\\ \frac{1}{4}\end{matrix}\middle|\frac{cx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{5}{2}}x^{\frac{3}{2}}\Gamma\left(\frac{1}{4}\right)}+\frac{B\Gamma\left(-\frac{1}{4}\right)\,{}_2F_1\left(\begin{matrix}-\frac{1}{4},\frac{5}{2}\\ \frac{3}{4}\end{matrix}\middle|\frac{cx^2e^{i\pi}}{a}\right)}{2a^{\frac{5}{2}}e^{\frac{5}{2}}\sqrt{x}\,\Gamma\left(\frac{3}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.11 Problem number 778

$$\int\frac{\sqrt{x}\,(A+Bx)}{(a^2+2abx+b^2x^2)^3}\,dx$$

Optimal antiderivative

$$\frac{(Ab-Ba)\,x^{\frac{3}{2}}}{5ab\,(bx+a)^5}+\frac{(7Ab+3Ba)\arctan\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{128a^{\frac{9}{2}}b^{\frac{5}{2}}}-\frac{(7Ab+3Ba)\sqrt{x}}{40a\,b^2\,(bx+a)^4}+\frac{(7Ab+3Ba)\sqrt{x}}{240a^2b^2\,(bx+a)^3}+\frac{(7Ab+3Ba)\sqrt{x}}{192a^3b^2\,(bx+a)^2}+\frac{(7Ab+3Ba)\sqrt{x}}{128a^4b^2\,(bx+a)}$$

command

```
integrate((B*x+A)*x**(1/2)/(b**2*x**2+2*a*b*x+a**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.12 Problem number 779

$$\int \frac{A+Bx}{\sqrt{x}\,\left(a^2+2abx+b^2x^2\right)^3}\,dx$$

Optimal antiderivative

$$\frac{7(9Ab+Ba)\arctan\left(\frac{\sqrt{b}\,\sqrt{x}}{\sqrt{a}}\right)}{128a^{\frac{11}{2}}b^{\frac{3}{2}}}+\frac{(Ab-Ba)\sqrt{x}}{5ab\,(bx+a)^5}+\frac{(9Ab+Ba)\sqrt{x}}{40a^2b\,(bx+a)^4}+\frac{7(9Ab+Ba)\sqrt{x}}{240a^3b\,(bx+a)^3}+\frac{7(9Ab+Ba)\sqrt{x}}{192a^4b\,(bx+a)^2}+\frac{7(9Ab+Ba)\sqrt{x}}{128a^5b\,(bx+a)}$$

command

```
integrate((B*x+A)/(b**2*x**2+2*a*b*x+a**2)**3/x**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.13 Problem number 841

$$\int x^m(1+x)\left(1+2x+x^2\right)^5\,dx$$

Optimal antiderivative

$$\frac{x^{1+m}}{1+m}+\frac{11x^{2+m}}{2+m}+\frac{55x^{3+m}}{3+m}+\frac{165x^{4+m}}{4+m}+\frac{330x^{5+m}}{5+m}+\frac{462x^{6+m}}{6+m}+\frac{462x^{7+m}}{7+m}+\frac{330x^{8+m}}{8+m}+\frac{165x^{9+m}}{9+m}+\frac{55x^{10+m}}{10+m}+\frac{11x^{11+m}}{11+m}+\frac{x^{12+m}}{12+m}$$

command

```
integrate(x**m*(1+x)*(x**2+2*x+1)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.14 Problem number 842

$$\int x^m(d+ex)\left(1+2x+x^2\right)^5\,dx$$

Optimal antiderivative

$$\frac{d\,x^{1+m}}{1+m}+\frac{(10d+e)\,x^{2+m}}{2+m}+\frac{5(9d+2e)\,x^{3+m}}{3+m}+\frac{15(8d+3e)\,x^{4+m}}{4+m}+\frac{30(7d+4e)\,x^{5+m}}{5+m}+\frac{42(6d+5e)\,x^{6+m}}{6+m}+\frac{42(5d+6e)\,x^{7+m}}{7+m}+\frac{30(4d+7e)\,x^{8+m}}{8+m}+\frac{15(3d+8e)\,x^{9+m}}{9+m}+\frac{5(2d+9e)\,x^{10+m}}{10+m}+\frac{(d+10e)\,x^{11+m}}{11+m}+\frac{e\,x^{12+m}}{12+m}$$

command

```
integrate(x**m*(e*x+d)*(x**2+2*x+1)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.15 Problem number 1009

$$\int\frac{x^{5/2}(A+Bx)}{a+bx+cx^2}\,dx$$

Optimal antiderivative

$$-\frac{2(-Ac+bB)\,x^{\frac{3}{2}}}{3c^{2}}+\frac{2B\,x^{\frac{5}{2}}}{5c}+\frac{2\left(-Abc-aBc+b^{2}B\right)\sqrt{x}}{c^{3}}$$
$$-\frac{\arctan\left(\frac{\sqrt{2}\,\sqrt{c}\,\sqrt{x}}{\sqrt{b-\sqrt{-4ac+b^{2}}}}\right)\sqrt{2}\,\left(B\,b^{3}-A\,b^{2}c-2abBc+aA\,c^{2}+\frac{-3aAb\,c^{2}+A\,b^{3}c-2a^{2}B\,c^{2}+4a\,b^{2}Bc-b^{4}B}{\sqrt{-4ac+b^{2}}}\right)}{c^{\frac{7}{2}}\sqrt{b-\sqrt{-4ac+b^{2}}}}$$
$$-\frac{\arctan\left(\frac{\sqrt{2}\,\sqrt{c}\,\sqrt{x}}{\sqrt{b+\sqrt{-4ac+b^{2}}}}\right)\sqrt{2}\,\left(B\,b^{3}-A\,b^{2}c-2abBc+aA\,c^{2}+\frac{3aAb\,c^{2}-A\,b^{3}c+2a^{2}B\,c^{2}-4a\,b^{2}Bc+b^{4}B}{\sqrt{-4ac+b^{2}}}\right)}{c^{\frac{7}{2}}\sqrt{b+\sqrt{-4ac+b^{2}}}}$$

command

```
integrate(x**(5/2)*(B*x+A)/(c*x**2+b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.16 Problem number 1010

$$\int \frac{x^{3/2}(A+Bx)}{a+bx+cx^{2}}\,dx$$

Optimal antiderivative

$$\frac{2B\,x^{\frac{3}{2}}}{3c}-\frac{2(-Ac+bB)\sqrt{x}}{c^{2}}$$
$$+\frac{\arctan\left(\frac{\sqrt{2}\,\sqrt{c}\,\sqrt{x}}{\sqrt{b-\sqrt{-4ac+b^{2}}}}\right)\sqrt{2}\,\left(b^{2}B-Abc-aBc+\frac{-2aA\,c^{2}+A\,b^{2}c+3abBc-B\,b^{3}}{\sqrt{-4ac+b^{2}}}\right)}{c^{\frac{5}{2}}\sqrt{b-\sqrt{-4ac+b^{2}}}}$$
$$+\frac{\arctan\left(\frac{\sqrt{2}\,\sqrt{c}\,\sqrt{x}}{\sqrt{b+\sqrt{-4ac+b^{2}}}}\right)\sqrt{2}\,\left(b^{2}B-Abc-aBc+\frac{2aA\,c^{2}-A\,b^{2}c-3abBc+B\,b^{3}}{\sqrt{-4ac+b^{2}}}\right)}{c^{\frac{5}{2}}\sqrt{b+\sqrt{-4ac+b^{2}}}}$$

command

```
integrate(x**(3/2)*(B*x+A)/(c*x**2+b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.17 Problem number 1013

$$\int \frac{A+Bx}{x^{3/2}\left(a+bx+cx^2\right)}\,dx$$

Optimal antiderivative

$$-\frac{2A}{a\sqrt{x}}-\frac{\arctan\left(\frac{\sqrt{2}\,\sqrt{c}\,\sqrt{x}}{\sqrt{b-\sqrt{-4ac+b^2}}}\right)\sqrt{2}\,\sqrt{c}\,\left(A+\frac{Ab-2Ba}{\sqrt{-4ac+b^2}}\right)}{a\sqrt{b-\sqrt{-4ac+b^2}}}$$
$$-\frac{\arctan\left(\frac{\sqrt{2}\,\sqrt{c}\,\sqrt{x}}{\sqrt{b+\sqrt{-4ac+b^2}}}\right)\sqrt{2}\,\sqrt{c}\,\left(A+\frac{-Ab+2Ba}{\sqrt{-4ac+b^2}}\right)}{a\sqrt{b+\sqrt{-4ac+b^2}}}$$

command

```
integrate((B*x+A)/x**(3/2)/(c*x**2+b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.18 Problem number 1114

$$\int (A+Bx)(d+ex)^m\left(bx+cx^2\right)^2\,dx$$

Optimal antiderivative

$$-\frac{d^2(-Ae+Bd)\,(-be+cd)^2\,(ex+d)^{1+m}}{e^6\,(1+m)}+\frac{d(-be+cd)\,(Bd(-3be+5cd)-2Ae(-be+2cd))\,(ex+d)^{2+m}}{e^6\,(2+m)}+\frac{\left(Ae\left(b^2e^2-6bcde+6c^2d^2\right)-Bd\left(3b^2e^2-12bcde+10c^2d^2\right)\right)(ex+d)^{3+m}}{e^6\,(3+m)}-\frac{\left(2Ace(-be+2cd)-B\left(b^2e^2-8bcde+10c^2d^2\right)\right)(ex+d)^{4+m}}{e^6\,(4+m)}-\frac{c(-Ace-2bBe+5Bcd)\,(ex+d)^{5+m}}{e^6\,(5+m)}+\frac{B\,c^2(ex+d)^{6+m}}{e^6\,(6+m)}$$

command

```
integrate((B*x+A)*(e*x+d)**m*(c*x**2+b*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.19 Problem number 1127

$$\int (A+Bx)(d+ex)^m\left(bx+cx^2\right)^3\,dx$$

Optimal antiderivative

$$-\frac{d^3(-Ae+Bd)\,(-be+cd)^3\,(ex+d)^{1+m}}{e^8\,(1+m)}+\frac{d^2(-be+cd)^2\,(Bd(-4be+7cd)-3Ae(-be+2cd))\,(ex+d)^{2+m}}{e^8\,(2+m)}+\frac{3d(-be+cd)\left(Ae\left(b^2e^2-5bcde+5c^2d^2\right)-Bd\left(2b^2e^2-8bcde+7c^2d^2\right)\right)(ex+d)^{3+m}}{e^8\,(3+m)}+\frac{\left(Bd\left(-4b^3e^3+30b^2cd\,e^2-60b\,c^2d^2e+35c^3d^3\right)-Ae\left(-b^3e^3+12b^2cd\,e^2-30b\,c^2d^2e+20c^3d^3\right)\right)(ex+d)^{4+m}}{e^8\,(4+m)}+\frac{\left(3Ace\left(b^2e^2-5bcde+5c^2d^2\right)-B\left(-b^3e^3+15b^2cd\,e^2-45b\,c^2d^2e+35c^3d^3\right)\right)(ex+d)^{5+m}}{e^8\,(5+m)}-\frac{3c\left(Ace(-be+2cd)-B\left(b^2e^2-6bcde+7c^2d^2\right)\right)(ex+d)^{6+m}}{e^8\,(6+m)}-\frac{c^2(-Ace-3bBe+7Bcd)\,(ex+d)^{7+m}}{e^8\,(7+m)}+\frac{B\,c^3(ex+d)^{8+m}}{e^8\,(8+m)}$$

command

```
integrate((B*x+A)*(e*x+d)**m*(c*x**2+b*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.20 Problem number 1229

$$\int \frac{(A+Bx)(d+ex)^{7/2}}{bx+cx^2}\,dx$$

Optimal antiderivative

$$\frac{2\Big(B(-be+cd)^2+Ace(-be+2cd)\Big)(ex+d)^{\frac{3}{2}}}{3c^3}+\frac{2(Ace-bBe+Bcd)(ex+d)^{\frac{5}{2}}}{5c^2}+\frac{2B(ex+d)^{\frac{7}{2}}}{7c}-\frac{2A\,d^{\frac{7}{2}}\operatorname{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)}{b}-\frac{2(-Ac+bB)(-be+cd)^{\frac{7}{2}}\operatorname{arctanh}\left(\frac{\sqrt{c}\,\sqrt{ex+d}}{\sqrt{-be+cd}}\right)}{b\,c^{\frac{9}{2}}}+\frac{2\Big(B(-be+cd)^3+Ace\big(b^2e^2-3bcde+3c^2d^2\big)\Big)\sqrt{ex+d}}{c^4}$$

command

```
integrate((B*x+A)*(e*x+d)**(7/2)/(c*x**2+b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2Ad^4\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{-d}}\right)}{b\sqrt{-d}}+\frac{2B(d+ex)^{\frac{7}{2}}}{7c}+\frac{(d+ex)^{\frac{5}{2}}\cdot(2Ace-2Bbe+2Bcd)}{5c^2}+\frac{(d+ex)^{\frac{3}{2}}\left(-2Abce^2+4Ac^2de+2Bb^2e^2-4Bbcde+2Bc^2d^2\right)}{3c^3}+\frac{\sqrt{d+ex}\left(2Ab^2ce^3-6Abc^2de^2+6Ac^3d^2e-2Bb^3e^3+6Bb^2cde^2-6Bbc^2d^2e+2Bc^3d^3\right)}{c^4}+\frac{2(-Ac+Bb)(be-cd)^4\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{be-cd}{c}}}\right)}{bc^5\sqrt{\frac{be-cd}{c}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.21 Problem number 1241

$$\int \frac{(A+Bx)(d+ex)^{3/2}}{\left(bx+cx^2\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{(3Abe-4Acd+2Bbd)\,\mathrm{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)\sqrt{d}}{b^3}-\frac{\left(4A\,c^2d-b^2Be-bc(Ae+2Bd)\right)\mathrm{arctanh}\left(\frac{\sqrt{c}\,\sqrt{ex+d}}{\sqrt{-be+cd}}\right)\sqrt{-be+cd}}{b^3c^{\frac{3}{2}}}-\frac{\left(Abcd+\left(2A\,c^2d+b^2Be-bc(Ae+Bd)\right)x\right)\sqrt{ex+d}}{b^2c\,(c\,x^2+bx)}$$

command

```
integrate((B*x+A)*(e*x+d)**(3/2)/(c*x**2+b*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.22 Problem number 1251

$$\int \frac{(A+Bx)\sqrt{d+ex}}{\left(bx+cx^2\right)^3}\,dx$$

Optimal antiderivative

$$-\frac{\left(48A\,c^2d^2+b^2e(-Ae+4Bd)-12bcd(Ae+2Bd)\right)\mathrm{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)}{4b^5d^{\frac{3}{2}}}+\frac{\left(48A\,c^3d^2-15b^3B\,e^2-12b\,c^2d(7Ae+2Bd)+5b^2ce(7Ae+8Bd)\right)\mathrm{arctanh}\left(\frac{\sqrt{c}\,\sqrt{ex+d}}{\sqrt{-be+cd}}\right)\sqrt{c}}{4b^5\,(-be+cd)^{\frac{3}{2}}}-\frac{(Ab-(-2Ac+bB)\,x)\sqrt{ex+d}}{2b^2\,(c\,x^2+bx)^2}-\frac{\left(b(-be+cd)\,(Abe-12Acd+6Bbd)-c\left(24A\,c^2d^2+b^2e(Ae+11Bd)-12bcd(2Ae+Bd)\right)x\right)\sqrt{ex+d}}{4b^4d\,(-be+cd)\,(c\,x^2+bx)}$$

command

```
integrate((B*x+A)*(e*x+d)**(1/2)/(c*x**2+b*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.23 Problem number 1444

$$\int \frac{(A+Bx)\left(a+cx^2\right)^3}{(d+ex)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2(-Ae+Bd)\left(a\,e^2+c\,d^2\right)^3}{5e^8\,(ex+d)^{\frac{5}{2}}}-\frac{2\left(a\,e^2+c\,d^2\right)^2\left(-6Acde+aB\,e^2+7Bc\,d^2\right)}{3e^8\,(ex+d)^{\frac{3}{2}}}$$
$$-\frac{2c^2\left(-3aA\,e^3-15Ac\,d^2e+15aBd\,e^2+35Bc\,d^3\right)(ex+d)^{\frac{3}{2}}}{3e^8}$$
$$+\frac{6c^2\left(-2Acde+aB\,e^2+7Bc\,d^2\right)(ex+d)^{\frac{5}{2}}}{5e^8}-\frac{2c^3(-Ae+7Bd)\,(ex+d)^{\frac{7}{2}}}{7e^8}$$
$$+\frac{2B\,c^3(ex+d)^{\frac{9}{2}}}{9e^8}+\frac{6c\left(a\,e^2+c\,d^2\right)\left(-aA\,e^3-5Ac\,d^2e+3aBd\,e^2+7Bc\,d^3\right)}{e^8\sqrt{ex+d}}$$
$$-\frac{2c\left(4Acde\left(3a\,e^2+5c\,d^2\right)-B\left(3a^2e^4+30ac\,d^2e^2+35c^2d^4\right)\right)\sqrt{ex+d}}{e^8}$$

command

```
integrate((B*x+A)*(c*x**2+a)**3/(e*x+d)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2Bc^3(d+ex)^{\frac{9}{2}}}{9e^8}+\frac{6c\left(ae^2+cd^2\right)\left(-Aae^3-5Acd^2e+3Bade^2+7Bcd^3\right)}{e^8\sqrt{d+ex}}$$
$$+\frac{(d+ex)^{\frac{7}{2}}\cdot\left(2Ac^3e-14Bc^3d\right)}{7e^8}+\frac{(d+ex)^{\frac{5}{2}}\left(-12Ac^3de+6Bac^2e^2+42Bc^3d^2\right)}{5e^8}$$
$$+\frac{(d+ex)^{\frac{3}{2}}\cdot\left(6Aac^2e^3+30Ac^3d^2e-30Bac^2de^2-70Bc^3d^3\right)}{3e^8}$$
$$+\frac{\sqrt{d+ex}\left(-24Aac^2de^3-40Ac^3d^3e+6Ba^2ce^4+60Bac^2d^2e^2+70Bc^3d^4\right)}{e^8}$$
$$-\frac{2\left(ae^2+cd^2\right)^2\left(-6Acde+Bae^2+7Bcd^2\right)}{3e^8\,(d+ex)^{\frac{3}{2}}}+\frac{2(-Ae+Bd)\left(ae^2+cd^2\right)^3}{5e^8\,(d+ex)^{\frac{5}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.24 Problem number 1447

$$\int \frac{(A+Bx)(d+ex)^{5/2}}{a-cx^2}\,dx$$

Optimal antiderivative

$$-\frac{2(Ae+Bd)\,(ex+d)^{\frac{3}{2}}}{3c}-\frac{2B(ex+d)^{\frac{5}{2}}}{5c}+\frac{\operatorname{arctanh}\left(\frac{c^{\frac{1}{4}}\sqrt{ex+d}}{\sqrt{-e\sqrt{a}+d\sqrt{c}}}\right)\left(B\sqrt{a}-A\sqrt{c}\right)\left(-e\sqrt{a}+d\sqrt{c}\right)^{\frac{5}{2}}}{c^{\frac{9}{4}}\sqrt{a}}+\frac{\operatorname{arctanh}\left(\frac{c^{\frac{1}{4}}\sqrt{ex+d}}{\sqrt{e\sqrt{a}+d\sqrt{c}}}\right)\left(B\sqrt{a}+A\sqrt{c}\right)\left(e\sqrt{a}+d\sqrt{c}\right)^{\frac{5}{2}}}{c^{\frac{9}{4}}\sqrt{a}}-\frac{2\left(2Acde+aB\,e^2+Bc\,d^2\right)\sqrt{ex+d}}{c^2}$$

command

```
integrate((B*x+A)*(e*x+d)**(5/2)/(-c*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.25 Problem number 1448

$$\int \frac{(A+Bx)(d+ex)^{3/2}}{a-cx^2}\,dx$$

Optimal antiderivative

$$-\frac{2B(ex+d)^{\frac{3}{2}}}{3c}+\frac{\operatorname{arctanh}\left(\frac{c^{\frac{1}{4}}\sqrt{ex+d}}{\sqrt{-e\sqrt{a}+d\sqrt{c}}}\right)\left(B\sqrt{a}-A\sqrt{c}\right)\left(-e\sqrt{a}+d\sqrt{c}\right)^{\frac{3}{2}}}{c^{\frac{7}{4}}\sqrt{a}}+\frac{\operatorname{arctanh}\left(\frac{c^{\frac{1}{4}}\sqrt{ex+d}}{\sqrt{e\sqrt{a}+d\sqrt{c}}}\right)\left(B\sqrt{a}+A\sqrt{c}\right)\left(e\sqrt{a}+d\sqrt{c}\right)^{\frac{3}{2}}}{c^{\frac{7}{4}}\sqrt{a}}-\frac{2(Ae+Bd)\sqrt{ex+d}}{c}$$

command

```
integrate((B*x+A)*(e*x+d)**(3/2)/(-c*x**2+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2Aae^3\operatorname{RootSum}\left(t^4\cdot\left(256a^3ce^6-256a^2c^2d^2e^4\right)+32t^2acde^2-1,\left(t\mapsto t\log\left(-64t^3a^2cde^4+64t^3ac^2d^3e^2-4tae^2\right.\right.\right.}{c}$$
$$+2Ad^2e\operatorname{RootSum}\left(t^4\cdot\left(256a^3ce^6-256a^2c^2d^2e^4\right)+32t^2acde^2-1,\left(t\mapsto t\log\left(-64t^3a^2cde^4+64t^3ac^2d^3e^2-4tae^2\right.\right.\right.$$
$$-2Ade\operatorname{RootSum}\left(256t^4a^2c^3e^4-32t^2ac^2de^2-ae^2+cd^2,\left(t\mapsto t\log\left(-64t^3ac^2e^2+4tcd+\sqrt{d+ex}\right)\right)\right)$$
$$-2Ade\operatorname{RootSum}\left(256t^4a^2c^3e^4-32t^2ac^2de^2-ae^2+cd^2,\left(t\mapsto t\log\left(-64t^3ac^2e^2+4tcd+\sqrt{d+ex}\right)\right)\right)$$
$$-\frac{2Ae\sqrt{d+ex}}{c}$$
$$-\frac{2Bade^2\operatorname{RootSum}\left(t^4\cdot\left(256a^3ce^6-256a^2c^2d^2e^4\right)+32t^2acde^2-1,\left(t\mapsto t\log\left(-64t^3a^2cde^4+64t^3ac^2d^3e^2-4ta\right.\right.\right.}{c}$$
$$-\frac{2Bae^2\operatorname{RootSum}\left(256t^4a^2c^3e^4-32t^2ac^2de^2-ae^2+cd^2,\left(t\mapsto t\log\left(-64t^3ac^2e^2+4tcd+\sqrt{d+ex}\right)\right)\right)}{c}$$
$$+2Bd^3\operatorname{RootSum}\left(t^4\cdot\left(256a^3ce^6-256a^2c^2d^2e^4\right)+32t^2acde^2-1,\left(t\mapsto t\log\left(-64t^3a^2cde^4+64t^3ac^2d^3e^2-4tae^2\right.\right.\right.$$
$$-2Bd^2\operatorname{RootSum}\left(256t^4a^2c^3e^4-32t^2ac^2de^2-ae^2+cd^2,\left(t\mapsto t\log\left(-64t^3ac^2e^2+4tcd+\sqrt{d+ex}\right)\right)\right)$$
$$-\frac{2Bd\sqrt{d+ex}}{c}-\frac{2B(d+ex)^{\frac{3}{2}}}{3c}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.26 Problem number 1487

$$\int (A+Bx)(d+ex)^m\left(a+cx^2\right)^3\,dx$$

Optimal antiderivative

$$
\begin{aligned}
& -\frac{(-Ae+Bd)\left(a\,e^2+c\,d^2\right)^3(ex+d)^{1+m}}{e^8\,(1+m)} \\
& +\frac{\left(a\,e^2+c\,d^2\right)^2\left(-6Acde+aB\,e^2+7Bc\,d^2\right)(ex+d)^{2+m}}{e^8\,(2+m)} \\
& -\frac{3c\left(a\,e^2+c\,d^2\right)\left(-aA\,e^3-5Ac\,d^2e+3aBd\,e^2+7Bc\,d^3\right)(ex+d)^{3+m}}{e^8\,(3+m)} \\
& -\frac{c\left(4Acde\left(3a\,e^2+5c\,d^2\right)-B\left(3a^2e^4+30ac\,d^2e^2+35c^2d^4\right)\right)(ex+d)^{4+m}}{e^8\,(4+m)} \\
& -\frac{c^2\left(-3aA\,e^3-15Ac\,d^2e+15aBd\,e^2+35Bc\,d^3\right)(ex+d)^{5+m}}{e^8\,(5+m)} \\
& +\frac{3c^2\left(-2Acde+aB\,e^2+7Bc\,d^2\right)(ex+d)^{6+m}}{e^8\,(6+m)} \\
& -\frac{c^3(-Ae+7Bd)\,(ex+d)^{7+m}}{e^8\,(7+m)}+\frac{B\,c^3(ex+d)^{8+m}}{e^8\,(8+m)}
\end{aligned}
$$

command

```
integrate((B*x+A)*(e*x+d)**m*(c*x**2+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.27 Problem number 1488

$$\int (A+Bx)(d+ex)^m\left(a+cx^2\right)^2\,dx$$

Optimal antiderivative

$$
\begin{aligned}
& -\frac{(-Ae+Bd)\left(a\,e^2+c\,d^2\right)^2(ex+d)^{1+m}}{e^6\,(1+m)} \\
& +\frac{\left(a\,e^2+c\,d^2\right)\left(-4Acde+aB\,e^2+5Bc\,d^2\right)(ex+d)^{2+m}}{e^6\,(2+m)} \\
& -\frac{2c\left(-aA\,e^3-3Ac\,d^2e+3aBd\,e^2+5Bc\,d^3\right)(ex+d)^{3+m}}{e^6\,(3+m)} \\
& +\frac{2c\left(-2Acde+aB\,e^2+5Bc\,d^2\right)(ex+d)^{4+m}}{e^6\,(4+m)} \\
& -\frac{c^2(-Ae+5Bd)\,(ex+d)^{5+m}}{e^6\,(5+m)}+\frac{B\,c^2(ex+d)^{6+m}}{e^6\,(6+m)}
\end{aligned}
$$

command

```
integrate((B*x+A)*(e*x+d)**m*(c*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.28 Problem number 1610

$$\int \frac{(b+2cx)\left(a+bx+cx^2\right)^3}{\sqrt{d+ex}}\,dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{2\left(a\,e^2-bde+c\,d^2\right)^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{\frac{3}{2}}}{3e^8}\\
&-\frac{6(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{\frac{5}{2}}}{5e^8}\\
&+\frac{2\left(70c^4d^4+b^4e^4-4b^2c\,e^3(-3ae+5bd)-20c^3d^2e(-3ae+7bd)+6c^2e^2\left(a^2e^2-10abde+15b^2d^2\right)\right)(ex+d)^{\frac{7}{2}}}{7e^8}\\
&-\frac{10c(-be+2cd)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{\frac{9}{2}}}{9e^8}\\
&+\frac{6c^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{\frac{11}{2}}}{11e^8}-\frac{14c^3(-be+2cd)(ex+d)^{\frac{13}{2}}}{13e^8}\\
&+\frac{4c^4(ex+d)^{\frac{15}{2}}}{15e^8}-\frac{2(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)^3\sqrt{ex+d}}{e^8}
\end{aligned}$$

command

```
integrate((2*c*x+b)*(c*x**2+b*x+a)**3/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.29 Problem number 1611

$$\int \frac{(b+2cx)\left(a+bx+cx^2\right)^3}{(d+ex)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{\frac{3}{2}}}{e^8}$$
$$+\frac{2\left(70c^4d^4+b^4e^4-4b^2c\,e^3(-3ae+5bd)-20c^3d^2e(-3ae+7bd)+6c^2e^2\left(a^2e^2-10abde+15b^2d^2\right)\right)(ex+d)^{\frac{5}{2}}}{5e^8}$$
$$-\frac{10c(-be+2cd)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{\frac{7}{2}}}{7e^8}$$
$$+\frac{2c^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{\frac{9}{2}}}{3e^8}-\frac{14c^3(-be+2cd)(ex+d)^{\frac{11}{2}}}{11e^8}$$
$$+\frac{4c^4(ex+d)^{\frac{13}{2}}}{13e^8}+\frac{2(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)^3}{e^8\sqrt{ex+d}}$$
$$+\frac{2\left(a\,e^2-bde+c\,d^2\right)^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)\sqrt{ex+d}}{e^8}$$

command

```
integrate((2*c*x+b)*(c*x**2+b*x+a)**3/(e*x+d)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{4c^4(d+ex)^{\frac{13}{2}}}{13e^8}+\frac{(d+ex)^{\frac{11}{2}}\cdot\left(14bc^3e-28c^4d\right)}{11e^8}$$
$$+\frac{(d+ex)^{\frac{9}{2}}\cdot\left(12ac^3e^2+18b^2c^2e^2-84bc^3de+84c^4d^2\right)}{9e^8}$$
$$+\frac{(d+ex)^{\frac{7}{2}}\cdot\left(30abc^2e^3-60ac^3de^2+10b^3ce^3-90b^2c^2de^2+210bc^3d^2e-140c^4d^3\right)}{7e^8}$$
$$+\frac{(d+ex)^{\frac{5}{2}}\cdot\left(12a^2c^2e^4+24ab^2ce^4-120abc^2de^3+120ac^3d^2e^2+2b^4e^4-40b^3cde^3+180b^2c^2d^2e^2-280bc^3d^3e+14\right.}{5e^8}$$
$$+\frac{(d+ex)^{\frac{3}{2}}\cdot\left(18a^2bce^5-36a^2c^2de^4+6ab^3e^5-72ab^2cde^4+180abc^2d^2e^3-120ac^3d^3e^2-6b^4de^4+60b^3cd^2e^3-18\right.}{3e^8}$$
$$+\frac{\sqrt{d+ex}\left(4a^3ce^6+6a^2b^2e^6-36a^2bcde^5+36a^2c^2d^2e^4-12ab^3de^5+72ab^2cd^2e^4-120abc^2d^3e^3+60ac^3d^4e^2+6b\right.}{e^8}$$
$$-\frac{2(be-2cd)\left(ae^2-bde+cd^2\right)^3}{e^8\sqrt{d+ex}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.30 Problem number 1612

$$\int \frac{(b+2cx)\left(a+bx+cx^2\right)^3}{(d+ex)^{5/2}}\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{2(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)^3}{3e^8\,(ex+d)^{\frac{3}{2}}}\\&+\frac{2\left(70c^4d^4+b^4e^4-4b^2c\,e^3(-3ae+5bd)-20c^3d^2e(-3ae+7bd)+6c^2e^2\left(a^2e^2-10abde+15b^2d^2\right)\right)(ex+d)^{\frac{3}{2}}}{3e^8}\\&-\frac{2c(-be+2cd)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{\frac{5}{2}}}{e^8}\\&+\frac{6c^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{\frac{7}{2}}}{7e^8}-\frac{14c^3(-be+2cd)\,(ex+d)^{\frac{9}{2}}}{9e^8}\\&+\frac{4c^4(ex+d)^{\frac{11}{2}}}{11e^8}-\frac{2\left(a\,e^2-bde+c\,d^2\right)^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)}{e^8\sqrt{ex+d}}\\&-\frac{6(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)\sqrt{ex+d}}{e^8}\end{aligned}$$

command

```
integrate((2*c*x+b)*(c*x**2+b*x+a)**3/(e*x+d)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}&\frac{4c^4(d+ex)^{\frac{11}{2}}}{11e^8}+\frac{(d+ex)^{\frac{9}{2}}\cdot\left(14bc^3e-28c^4d\right)}{9e^8}\\&+\frac{(d+ex)^{\frac{7}{2}}\cdot\left(12ac^3e^2+18b^2c^2e^2-84bc^3de+84c^4d^2\right)}{7e^8}\\&+\frac{(d+ex)^{\frac{5}{2}}\cdot\left(30abc^2e^3-60ac^3de^2+10b^3ce^3-90b^2c^2de^2+210bc^3d^2e-140c^4d^3\right)}{5e^8}\\&+\frac{(d+ex)^{\frac{3}{2}}\cdot\left(12a^2c^2e^4+24ab^2ce^4-120abc^2de^3+120ac^3d^2e^2+2b^4e^4-40b^3cde^3+180b^2c^2d^2e^2-280bc^3d^3e+14\right.}{3e^8}\\&+\frac{\sqrt{d+ex}\left(18a^2bce^5-36a^2c^2de^4+6ab^3e^5-72ab^2cde^4+180abc^2d^2e^3-120ac^3d^3e^2-6b^4de^4+60b^3cd^2e^3-180b\right.}{e^8}\\&-\frac{2\left(ae^2-bde+cd^2\right)^2\cdot\left(2ace^2+3b^2e^2-14bcde+14c^2d^2\right)}{e^8\sqrt{d+ex}}-\frac{2(be-2cd)\left(ae^2-bde+cd^2\right)^3}{3e^8\,(d+ex)^{\frac{3}{2}}}\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.31 Problem number 1654

$$\int (b+2cx)(d+ex)^m\left(a+bx+cx^2\right)^3\,dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)^3(ex+d)^{1+m}}{e^8\,(1+m)}\\
&+\frac{\left(a\,e^2-bde+c\,d^2\right)^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{2+m}}{e^8\,(2+m)}\\
&-\frac{3(-be+2cd)\left(a\,e^2-bde+c\,d^2\right)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{3+m}}{e^8\,(3+m)}\\
&+\frac{\left(70c^4d^4+b^4e^4-4b^2c\,e^3(-3ae+5bd)-20c^3d^2e(-3ae+7bd)+6c^2e^2\left(a^2e^2-10abde+15b^2d^2\right)\right)(ex+d)^{4+m}}{e^8\,(4+m)}\\
&-\frac{5c(-be+2cd)\left(7c^2d^2+b^2e^2-ce(-3ae+7bd)\right)(ex+d)^{5+m}}{e^8\,(5+m)}\\
&+\frac{3c^2\left(14c^2d^2+3b^2e^2-2ce(-ae+7bd)\right)(ex+d)^{6+m}}{e^8\,(6+m)}\\
&-\frac{7c^3(-be+2cd)\,(ex+d)^{7+m}}{e^8\,(7+m)}+\frac{2c^4(ex+d)^{8+m}}{e^8\,(8+m)}
\end{aligned}$$

command

```
integrate((2*c*x+b)*(e*x+d)**m*(c*x**2+b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.32 Problem number 1655

$$\int (b+2cx)(d+ex)^m\left(a+bx+cx^2\right)^2\,dx$$

Optimal antiderivative

$$
\begin{aligned}
&-\frac{(-be+2cd)\left(a e^2-bde+c d^2\right)^2 (ex+d)^{1+m}}{e^6 (1+m)} \\
&+\frac{2\left(a e^2-bde+c d^2\right)\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)(ex+d)^{2+m}}{e^6 (2+m)} \\
&-\frac{(-be+2cd)\left(10c^2d^2+b^2e^2-2ce(-3ae+5bd)\right)(ex+d)^{3+m}}{e^6 (3+m)} \\
&+\frac{4c\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)(ex+d)^{4+m}}{e^6 (4+m)} \\
&-\frac{5c^2(-be+2cd)(ex+d)^{5+m}}{e^6 (5+m)}+\frac{2c^3(ex+d)^{6+m}}{e^6 (6+m)}
\end{aligned}
$$

command

```
integrate((2*c*x+b)*(e*x+d)**m*(c*x**2+b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.33 Problem number 1804

$$
\int \frac{(A+Bx)\left(a^2+2abx+b^2x^2\right)^3}{\sqrt{d+ex}}\,dx
$$

Optimal antiderivative

$$
\begin{aligned}
&\frac{2(-ae+bd)^5 (-6Abe-Bae+7Bbd)(ex+d)^{\frac{3}{2}}}{3e^8} \\
&-\frac{6b(-ae+bd)^4 (-5Abe-2Bae+7Bbd)(ex+d)^{\frac{5}{2}}}{5e^8} \\
&+\frac{10b^2(-ae+bd)^3 (-4Abe-3Bae+7Bbd)(ex+d)^{\frac{7}{2}}}{7e^8} \\
&-\frac{10b^3(-ae+bd)^2 (-3Abe-4Bae+7Bbd)(ex+d)^{\frac{9}{2}}}{9e^8} \\
&+\frac{6b^4(-ae+bd)(-2Abe-5Bae+7Bbd)(ex+d)^{\frac{11}{2}}}{11e^8} \\
&-\frac{2b^5(-Abe-6Bae+7Bbd)(ex+d)^{\frac{13}{2}}}{13e^8} \\
&+\frac{2b^6B(ex+d)^{\frac{15}{2}}}{15e^8}-\frac{2(-ae+bd)^6 (-Ae+Bd)\sqrt{ex+d}}{e^8}
\end{aligned}
$$

command

```
integrate((B*x+A)*(b**2*x**2+2*a*b*x+a**2)**3/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.34 Problem number 1805

$$\int \frac{(A+Bx)\left(a^2+2abx+b^2x^2\right)^3}{(d+ex)^{3/2}}\,dx$$

Optimal antiderivative

$$\begin{aligned}&-\frac{2b(-ae+bd)^4\left(-5Abe-2Bae+7Bbd\right)(ex+d)^{\frac{3}{2}}}{e^8}\\&+\frac{2b^2(-ae+bd)^3\left(-4Abe-3Bae+7Bbd\right)(ex+d)^{\frac{5}{2}}}{e^8}\\&-\frac{10b^3(-ae+bd)^2\left(-3Abe-4Bae+7Bbd\right)(ex+d)^{\frac{7}{2}}}{7e^8}\\&+\frac{2b^4(-ae+bd)\left(-2Abe-5Bae+7Bbd\right)(ex+d)^{\frac{9}{2}}}{3e^8}\\&-\frac{2b^5(-Abe-6Bae+7Bbd)(ex+d)^{\frac{11}{2}}}{11e^8}+\frac{2b^6B(ex+d)^{\frac{13}{2}}}{13e^8}\\&+\frac{2(-ae+bd)^6\left(-Ae+Bd\right)}{e^8\sqrt{ex+d}}+\frac{2(-ae+bd)^5\left(-6Abe-Bae+7Bbd\right)\sqrt{ex+d}}{e^8}\end{aligned}$$

command

```
integrate((B*x+A)*(b**2*x**2+2*a*b*x+a**2)**3/(e*x+d)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2Bb^6(d+ex)^{\frac{13}{2}}}{13e^8}+\frac{(d+ex)^{\frac{11}{2}}\cdot(2Ab^6e+12Bab^5e-14Bb^6d)}{11e^8}$$
$$+\frac{(d+ex)^{\frac{9}{2}}\cdot(12Aab^5e^2-12Ab^6de+30Ba^2b^4e^2-72Bab^5de+42Bb^6d^2)}{9e^8}$$
$$+\frac{(d+ex)^{\frac{7}{2}}\cdot(30Aa^2b^4e^3-60Aab^5de^2+30Ab^6d^2e+40Ba^3b^3e^3-150Ba^2b^4de^2+180Bab^5d^2e-70Bb^6d^3)}{7e^8}$$
$$+\frac{(d+ex)^{\frac{5}{2}}\cdot(40Aa^3b^3e^4-120Aa^2b^4de^3+120Aab^5d^2e^2-40Ab^6d^3e+30Ba^4b^2e^4-160Ba^3b^3de^3+300Ba^2b^4d^2e^2}{5e^8}$$
$$+\frac{(d+ex)^{\frac{3}{2}}\cdot(30Aa^4b^2e^5-120Aa^3b^3de^4+180Aa^2b^4d^2e^3-120Aab^5d^3e^2+30Ab^6d^4e+12Ba^5be^5-90Ba^4b^2de^4+}{3e^8}$$
$$+\frac{\sqrt{d+ex}\,(12Aa^5be^6-60Aa^4b^2de^5+120Aa^3b^3d^2e^4-120Aa^2b^4d^3e^3+60Aab^5d^4e^2-12Ab^6d^5e+2Ba^6e^6-24B}{e^8}$$
$$+\frac{2(-Ae+Bd)\,(ae-bd)^6}{e^8\sqrt{d+ex}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.35 Problem number 1806

$$\int \frac{(A+Bx)\left(a^2+2abx+b^2x^2\right)^3}{(d+ex)^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{2(-ae+bd)^6\,(-Ae+Bd)}{3e^8\,(ex+d)^{\frac{3}{2}}}+\frac{10b^2(-ae+bd)^3\,(-4Abe-3Bae+7Bbd)\,(ex+d)^{\frac{3}{2}}}{3e^8}$$
$$-\frac{2b^3(-ae+bd)^2\,(-3Abe-4Bae+7Bbd)\,(ex+d)^{\frac{5}{2}}}{e^8}$$
$$+\frac{6b^4(-ae+bd)\,(-2Abe-5Bae+7Bbd)\,(ex+d)^{\frac{7}{2}}}{7e^8}$$
$$-\frac{2b^5(-Abe-6Bae+7Bbd)\,(ex+d)^{\frac{9}{2}}}{9e^8}+\frac{2b^6B(ex+d)^{\frac{11}{2}}}{11e^8}$$
$$-\frac{2(-ae+bd)^5\,(-6Abe-Bae+7Bbd)}{e^8\sqrt{ex+d}}$$
$$-\frac{6b(-ae+bd)^4\,(-5Abe-2Bae+7Bbd)\,\sqrt{ex+d}}{e^8}$$

command

```
integrate((B*x+A)*(b**2*x**2+2*a*b*x+a**2)**3/(e*x+d)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
\begin{aligned}
&\frac{2Bb^6(d+ex)^{\frac{11}{2}}}{11e^8}+\frac{(d+ex)^{\frac{9}{2}}\cdot\left(2Ab^6e+12Bab^5e-14Bb^6d\right)}{9e^8}\\
&+\frac{(d+ex)^{\frac{7}{2}}\cdot\left(12Aab^5e^2-12Ab^6de+30Ba^2b^4e^2-72Bab^5de+42Bb^6d^2\right)}{7e^8}\\
&+\frac{(d+ex)^{\frac{5}{2}}\cdot\left(30Aa^2b^4e^3-60Aab^5de^2+30Ab^6d^2e+40Ba^3b^3e^3-150Ba^2b^4de^2+180Bab^5d^2e-70Bb^6d^3\right)}{5e^8}\\
&+\frac{(d+ex)^{\frac{3}{2}}\cdot\left(40Aa^3b^3e^4-120Aa^2b^4de^3+120Aab^5d^2e^2-40Ab^6d^3e+30Ba^4b^2e^4-160Ba^3b^3de^3+300Ba^2b^4d^2e^2\right.}{3e^8}\\
&+\frac{\sqrt{d+ex}\left(30Aa^4b^2e^5-120Aa^3b^3de^4+180Aa^2b^4d^2e^3-120Aab^5d^3e^2+30Ab^6d^4e+12Ba^5be^5-90Ba^4b^2de^4+2\right.}{e^8}\\
&-\frac{2(ae-bd)^5\cdot(6Abe+Bae-7Bbd)}{e^8\sqrt{d+ex}}+\frac{2(-Ae+Bd)\,(ae-bd)^6}{3e^8\,(d+ex)^{\frac{3}{2}}}
\end{aligned}
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.36 Problem number 1807

$$
\int\frac{(A+Bx)\left(a^2+2abx+b^2x^2\right)^3}{(d+ex)^{7/2}}\,dx
$$

Optimal antiderivative

$$
\begin{aligned}
&\frac{2(-ae+bd)^6\,(-Ae+Bd)}{5e^8\,(ex+d)^{\frac{5}{2}}}-\frac{2(-ae+bd)^5\,(-6Abe-Bae+7Bbd)}{3e^8\,(ex+d)^{\frac{3}{2}}}\\
&-\frac{10b^3(-ae+bd)^2\,(-3Abe-4Bae+7Bbd)\,(ex+d)^{\frac{3}{2}}}{3e^8}\\
&+\frac{6b^4(-ae+bd)\,(-2Abe-5Bae+7Bbd)\,(ex+d)^{\frac{5}{2}}}{5e^8}\\
&-\frac{2b^5(-Abe-6Bae+7Bbd)\,(ex+d)^{\frac{7}{2}}}{7e^8}+\frac{2b^6B(ex+d)^{\frac{9}{2}}}{9e^8}\\
&+\frac{6b(-ae+bd)^4\,(-5Abe-2Bae+7Bbd)}{e^8\sqrt{ex+d}}\\
&+\frac{10b^2(-ae+bd)^3\,(-4Abe-3Bae+7Bbd)\,\sqrt{ex+d}}{e^8}
\end{aligned}
$$

command

```
integrate((B*x+A)*(b**2*x**2+2*a*b*x+a**2)**3/(e*x+d)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2Bb^6(d+ex)^{\frac{9}{2}}}{9e^8} - \frac{6b(ae-bd)^4\cdot(5Abe+2Bae-7Bbd)}{e^8\sqrt{d+ex}} + \frac{(d+ex)^{\frac{7}{2}}\cdot(2Ab^6e+12Bab^5e-14Bb^6d)}{7e^8} + \frac{(d+ex)^{\frac{5}{2}}\cdot(12Aab^5e^2-12Ab^6de+30Ba^2b^4e^2-72Bab^5de+42Bb^6d^2)}{5e^8} + \frac{(d+ex)^{\frac{3}{2}}\cdot(30Aa^2b^4e^3-60Aab^5de^2+30Ab^6d^2e+40Ba^3b^3e^3-150Ba^2b^4de^2+180Bab^5d^2e-70Bb^6d^3)}{3e^8} + \frac{\sqrt{d+ex}\,(40Aa^3b^3e^4-120Aa^2b^4de^3+120Aab^5d^2e^2-40Ab^6d^3e+30Ba^4b^2e^4-160Ba^3b^3de^3+300Ba^2b^4d^2e^2-}{e^8} - \frac{2(ae-bd)^5\cdot(6Abe+Bae-7Bbd)}{3e^8(d+ex)^{\frac{3}{2}}} + \frac{2(-Ae+Bd)(ae-bd)^6}{5e^8(d+ex)^{\frac{5}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.37 Problem number 1810

$$\int \frac{(A+Bx)(d+ex)^{3/2}}{a^2+2abx+b^2x^2}\,dx$$

Optimal antiderivative

$$\frac{(3Abe-5Bae+2Bbd)(ex+d)^{\frac{3}{2}}}{3b^2(-ae+bd)} - \frac{(Ab-Ba)(ex+d)^{\frac{5}{2}}}{b(-ae+bd)(bx+a)} - \frac{(3Abe-5Bae+2Bbd)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)\sqrt{-ae+bd}}{b^{\frac{7}{2}}} + \frac{(3Abe-5Bae+2Bbd)\sqrt{ex+d}}{b^3}$$

command

```
integrate((B*x+A)*(e*x+d)**(3/2)/(b**2*x**2+2*a*b*x+a**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.38 Problem number 1820

$$\int \frac{(A+Bx)\sqrt{d+ex}}{(a^2+2abx+b^2x^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{(Ab-Ba)(ex+d)^{\frac{3}{2}}}{3b(-ae+bd)(bx+a)^3}+\frac{e^2(-Abe-Bae+2Bbd)\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{8b^{\frac{5}{2}}(-ae+bd)^{\frac{5}{2}}}-\frac{(-Abe-Bae+2Bbd)\sqrt{ex+d}}{4b^2(-ae+bd)(bx+a)^2}-\frac{e(-Abe-Bae+2Bbd)\sqrt{ex+d}}{8b^2(-ae+bd)^2(bx+a)}$$

command

```
integrate((B*x+A)*(e*x+d)**(1/2)/(b**2*x**2+2*a*b*x+a**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.39 Problem number 1884

$$\int (A+Bx)(d+ex)^m\left(a^2+2abx+b^2x^2\right)^2\,dx$$

Optimal antiderivative

$$-\frac{(-ae+bd)^4(-Ae+Bd)(ex+d)^{1+m}}{e^6(1+m)}+\frac{(-ae+bd)^3(-4Abe-Bae+5Bbd)(ex+d)^{2+m}}{e^6(2+m)}-\frac{2b(-ae+bd)^2(-3Abe-2Bae+5Bbd)(ex+d)^{3+m}}{e^6(3+m)}+\frac{2b^2(-ae+bd)(-2Abe-3Bae+5Bbd)(ex+d)^{4+m}}{e^6(4+m)}-\frac{b^3(-Abe-4Bae+5Bbd)(ex+d)^{5+m}}{e^6(5+m)}+\frac{b^4B(ex+d)^{6+m}}{e^6(6+m)}$$

command

```
integrate((B*x+A)*(e*x+d)**m*(b**2*x**2+2*a*b*x+a**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.40 Problem number 2065

$$\int \frac{(a+bx)\left(a^2+2abx+b^2x^2\right)^3}{(d+ex)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2(-ae+bd)^7}{5e^8\,(ex+d)^{\frac{5}{2}}}-\frac{14b(-ae+bd)^6}{3e^8\,(ex+d)^{\frac{3}{2}}}-\frac{70b^4(-ae+bd)^3\,(ex+d)^{\frac{3}{2}}}{3e^8}+\frac{42b^5(-ae+bd)^2\,(ex+d)^{\frac{5}{2}}}{5e^8}-\frac{2b^6(-ae+bd)\,(ex+d)^{\frac{7}{2}}}{e^8}+\frac{2b^7(ex+d)^{\frac{9}{2}}}{9e^8}+\frac{42b^2(-ae+bd)^5}{e^8\sqrt{ex+d}}+\frac{70b^3(-ae+bd)^4\,\sqrt{ex+d}}{e^8}$$

command

```
integrate((b*x+a)*(b**2*x**2+2*a*b*x+a**2)**3/(e*x+d)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2b^7(d+ex)^{\frac{9}{2}}}{9e^8}-\frac{42b^2(ae-bd)^5}{e^8\sqrt{d+ex}}-\frac{14b(ae-bd)^6}{3e^8\,(d+ex)^{\frac{3}{2}}}+\frac{(d+ex)^{\frac{7}{2}}\cdot\left(14ab^6e-14b^7d\right)}{7e^8}+\frac{(d+ex)^{\frac{5}{2}}\cdot\left(42a^2b^5e^2-84ab^6de+42b^7d^2\right)}{5e^8}+\frac{(d+ex)^{\frac{3}{2}}\cdot\left(70a^3b^4e^3-210a^2b^5de^2+210ab^6d^2e-70b^7d^3\right)}{3e^8}+\frac{\sqrt{d+ex}\,\left(70a^4b^3e^4-280a^3b^4de^3+420a^2b^5d^2e^2-280ab^6d^3e+70b^7d^4\right)}{e^8}-\frac{2(ae-bd)^7}{5e^8\,(d+ex)^{\frac{5}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.41 Problem number 2066

$$\int \frac{(a+bx)(d+ex)^{7/2}}{a^2+2abx+b^2x^2}\,dx$$

Optimal antiderivative

$$\frac{2(-ae+bd)^2\,(ex+d)^{\frac{3}{2}}}{3b^3}+\frac{2(-ae+bd)\,(ex+d)^{\frac{5}{2}}}{5b^2}+\frac{2(ex+d)^{\frac{7}{2}}}{7b}-\frac{2(-ae+bd)^{\frac{7}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{b^{\frac{9}{2}}}+\frac{2(-ae+bd)^3\,\sqrt{ex+d}}{b^4}$$

command

```
integrate((b*x+a)*(e*x+d)**(7/2)/(b**2*x**2+2*a*b*x+a**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2(d+ex)^{\frac{7}{2}}}{7b}+\frac{(d+ex)^{\frac{5}{2}}\left(-2ae+2bd\right)}{5b^2}+\frac{(d+ex)^{\frac{3}{2}}\cdot\left(2a^2e^2-4abde+2b^2d^2\right)}{3b^3}+\frac{\sqrt{d+ex}\left(-2a^3e^3+6a^2bde^2-6ab^2d^2e+2b^3d^3\right)}{b^4}+\frac{2(ae-bd)^4\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{ae-bd}{b}}}\right)}{b^5\sqrt{\frac{ae-bd}{b}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.42 Problem number 2067

$$\int\frac{(a+bx)(d+ex)^{5/2}}{a^2+2abx+b^2x^2}\,dx$$

Optimal antiderivative

$$\frac{2(-ae+bd)\left(ex+d\right)^{\frac{3}{2}}}{3b^2}+\frac{2(ex+d)^{\frac{5}{2}}}{5b}-\frac{2(-ae+bd)^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{b^{\frac{7}{2}}}+\frac{2(-ae+bd)^2\sqrt{ex+d}}{b^3}$$

command

```
integrate((b*x+a)*(e*x+d)**(5/2)/(b**2*x**2+2*a*b*x+a**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2(d+ex)^{\frac{5}{2}}}{5b}+\frac{(d+ex)^{\frac{3}{2}}\left(-2ae+2bd\right)}{3b^2}+\frac{\sqrt{d+ex}\left(2a^2e^2-4abde+2b^2d^2\right)}{b^3}-\frac{2(ae-bd)^3\operatorname{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{ae-bd}{b}}}\right)}{b^4\sqrt{\frac{ae-bd}{b}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.43 Problem number 2068

$$\int \frac{(a+bx)(d+ex)^{3/2}}{a^2+2abx+b^2x^2}\,dx$$

Optimal antiderivative

$$\frac{2(ex+d)^{\frac{3}{2}}}{3b}-\frac{2(-ae+bd)^{\frac{3}{2}}\,\mathrm{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{b^{\frac{5}{2}}}+\frac{2(-ae+bd)\,\sqrt{ex+d}}{b^2}$$

command

```
integrate((b*x+a)*(e*x+d)**(3/2)/(b**2*x**2+2*a*b*x+a**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2(d+ex)^{\frac{3}{2}}}{3b}+\frac{\sqrt{d+ex}\,(-2ae+2bd)}{b^2}+\frac{2(ae-bd)^2\,\mathrm{atan}\left(\frac{\sqrt{d+ex}}{\sqrt{\frac{ae-bd}{b}}}\right)}{b^3\sqrt{\frac{ae-bd}{b}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.44 Problem number 2078

$$\int \frac{(a+bx)\sqrt{d+ex}}{(a^2+2abx+b^2x^2)^2}\,dx$$

Optimal antiderivative

$$\frac{e^2\,\mathrm{arctanh}\left(\frac{\sqrt{b}\,\sqrt{ex+d}}{\sqrt{-ae+bd}}\right)}{4b^{\frac{3}{2}}\,(-ae+bd)^{\frac{3}{2}}}-\frac{\sqrt{ex+d}}{2b\,(bx+a)^2}-\frac{e\sqrt{ex+d}}{4b\,(-ae+bd)\,(bx+a)}$$

command

```
integrate((b*x+a)*(e*x+d)**(1/2)/(b**2*x**2+2*a*b*x+a**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.45 Problem number 2146

$$\int (a+bx)(d+ex)^m \left(a^2+2abx+b^2x^2\right)^3 \, dx$$

Optimal antiderivative

$$-\frac{(-ae+bd)^7 (ex+d)^{1+m}}{e^8 (1+m)}+\frac{7b(-ae+bd)^6 (ex+d)^{2+m}}{e^8 (2+m)}-\frac{21b^2(-ae+bd)^5 (ex+d)^{3+m}}{e^8 (3+m)}+\frac{35b^3(-ae+bd)^4 (ex+d)^{4+m}}{e^8 (4+m)}-\frac{35b^4(-ae+bd)^3 (ex+d)^{5+m}}{e^8 (5+m)}+\frac{21b^5(-ae+bd)^2 (ex+d)^{6+m}}{e^8 (6+m)}-\frac{7b^6(-ae+bd) (ex+d)^{7+m}}{e^8 (7+m)}+\frac{b^7(ex+d)^{8+m}}{e^8 (8+m)}$$

command

```
integrate((b*x+a)*(e*x+d)**m*(b**2*x**2+2*a*b*x+a**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.46 Problem number 2147

$$\int (a+bx)(d+ex)^m \left(a^2+2abx+b^2x^2\right)^2 \, dx$$

Optimal antiderivative

$$-\frac{(-ae+bd)^5 (ex+d)^{1+m}}{e^6 (1+m)}+\frac{5b(-ae+bd)^4 (ex+d)^{2+m}}{e^6 (2+m)}-\frac{10b^2(-ae+bd)^3 (ex+d)^{3+m}}{e^6 (3+m)}+\frac{10b^3(-ae+bd)^2 (ex+d)^{4+m}}{e^6 (4+m)}-\frac{5b^4(-ae+bd) (ex+d)^{5+m}}{e^6 (5+m)}+\frac{b^5(ex+d)^{6+m}}{e^6 (6+m)}$$

command

```
integrate((b*x+a)*(e*x+d)**m*(b**2*x**2+2*a*b*x+a**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.47 Problem number 2570

$$\int \frac{(5-x)\sqrt{3+2x}}{(2+5x+3x^2)^3}\,dx$$

Optimal antiderivative

$$730\,\mathrm{arctanh}\left(\sqrt{3+2x}\right)-\frac{4713\,\mathrm{arctanh}\left(\frac{\sqrt{15}\,\sqrt{3+2x}}{5}\right)\sqrt{15}}{25}-\frac{(29+35x)\sqrt{3+2x}}{2\left(3x^2+5x+2\right)^2}+\frac{3(878+1063x)\sqrt{3+2x}}{10\left(3x^2+5x+2\right)}$$

command

```
integrate((5-x)*(3+2*x)**(1/2)/(3*x**2+5*x+2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-2712\left(\left\{\frac{\sqrt{15}\left(-\frac{\log\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}-1\right)}{4}+\frac{\log\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}+1\right)}{4}-\frac{1}{4\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}+1\right)}-\frac{1}{4\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}-1\right)}\right)}{75}\right.\right.$$

$$+2040\left(\left\{\frac{\sqrt{15}\cdot\left(\frac{3\log\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}-1\right)}{16}-\frac{3\log\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}+1\right)}{16}+\frac{3}{16\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}+1\right)}+\frac{1}{16\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}+1\right)^2}+\right.}{375}\right.\right.$$

$$+2526\left(\begin{cases}-\frac{\sqrt{15}\,\mathrm{acoth}\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}\right)}{15} & \text{for } x>-\frac{2}{3}\\ -\frac{\sqrt{15}\,\mathrm{atanh}\left(\frac{\sqrt{15}\,\sqrt{2x+3}}{5}\right)}{15} & \text{for } x<-\frac{2}{3}\end{cases}\right)-365\log\left(\sqrt{2x+3}-1\right)$$

$$+365\log\left(\sqrt{2x+3}+1\right)+\frac{56}{\sqrt{2x+3}+1}-\frac{3}{\left(\sqrt{2x+3}+1\right)^2}+\frac{56}{\sqrt{2x+3}-1}+\frac{3}{\left(\sqrt{2x+3}-1\right)^2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

22.48 Problem number 2640

$$\int (A+Bx)(d+ex)^m \left(a+bx+cx^2\right)^3 \, dx$$

Optimal antiderivative

$$-\frac{(-Ae+Bd)\left(a e^2-bde+c d^2\right)^3 (ex+d)^{1+m}}{e^8 (1+m)}$$
$$-\frac{\left(a e^2-bde+c d^2\right)^2 \left(3Ae(-be+2cd)-B\left(7c d^2-e(-ae+4bd)\right)\right) (ex+d)^{2+m}}{e^8 (2+m)}$$
$$-\frac{3\left(a e^2-bde+c d^2\right) \left(B\left(7c^2d^3-cde(-3ae+8bd)+b e^2(-ae+2bd)\right)-Ae\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)\right) (ex\ \cdots}{e^8 (3+m)}$$
$$-\frac{\left(Ae(-be+2cd)\left(10c^2d^2+b^2e^2-2ce(-3ae+5bd)\right)-B\left(35c^3d^4-b^2e^3(-3ae+4bd)-30c^2d^2e(-ae+2bd)+3c\ \cdots\right.\right.}{e^8 (4+m)}$$
$$-\frac{\left(B\left(35c^3d^3-b^3e^3+3bc e^2(-2ae+5bd)-15c^2de(-ae+3bd)\right)-3Ace\left(5c^2d^2+b^2e^2-ce(-ae+5bd)\right)\right) (ex+d)^{5\cdots}}{e^8 (5+m)}$$
$$-\frac{3c\left(Ace(-be+2cd)-B\left(7c^2d^2+b^2e^2-ce(-ae+6bd)\right)\right) (ex+d)^{6+m}}{e^8 (6+m)}$$
$$-\frac{c^2(-Ace-3bBe+7Bcd) (ex+d)^{7+m}}{e^8 (7+m)}+\frac{B c^3(ex+d)^{8+m}}{e^8 (8+m)}$$

command

```
integrate((B*x+A)*(e*x+d)**m*(c*x**2+b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

22.49 Problem number 2641

$$\int (A+Bx)(d+ex)^m \left(a+bx+cx^2\right)^2 \, dx$$

Optimal antiderivative

$$-\frac{(-Ae+Bd)\left(a\,e^2-bde+c\,d^2\right)^2(ex+d)^{1+m}}{e^6\,(1+m)}$$
$$-\frac{\left(a\,e^2-bde+c\,d^2\right)\left(2Ae(-be+2cd)-B\left(5c\,d^2-e(-ae+3bd)\right)\right)(ex+d)^{2+m}}{e^6\,(2+m)}$$
$$-\frac{\left(B\left(10c^2d^3+b\,e^2(-2ae+3bd)-6cde(-ae+2bd)\right)-Ae\left(6c^2d^2+b^2e^2-2ce(-ae+3bd)\right)\right)(ex+d)^{3+m}}{e^6\,(3+m)}$$
$$-\frac{\left(2Ace(-be+2cd)-B\left(10c^2d^2+b^2e^2-2ce(-ae+4bd)\right)\right)(ex+d)^{4+m}}{e^6\,(4+m)}$$
$$-\frac{c(-Ace-2bBe+5Bcd)\,(ex+d)^{5+m}}{e^6\,(5+m)}+\frac{B\,c^2(ex+d)^{6+m}}{e^6\,(6+m)}$$

command

```
integrate((B*x+A)*(e*x+d)**m*(c*x**2+b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

23 Test file number 35

Test folder name:

```
test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.1_Quadratic/35_1.2.1.4-d+e_x-^m-f+g_x-^n-a+b_x+c_x^2-^p
```

23.1 Problem number 359

$$\int x^2(a+bx)^n\left(c+dx^2\right)^3\,dx$$

Optimal antiderivative

$$\frac{a^2\left(a^2d+b^2c\right)^3(bx+a)^{1+n}}{b^9\,(1+n)}-\frac{2a\left(a^2d+b^2c\right)^2\left(4a^2d+b^2c\right)(bx+a)^{2+n}}{b^9\,(2+n)}$$
$$+\frac{\left(a^2d+b^2c\right)\left(28a^4d^2+17a^2b^2cd+b^4c^2\right)(bx+a)^{3+n}}{b^9\,(3+n)}$$
$$-\frac{4ad\left(14a^4d^2+15a^2b^2cd+3b^4c^2\right)(bx+a)^{4+n}}{b^9\,(4+n)}$$
$$+\frac{d\left(70a^4d^2+45a^2b^2cd+3b^4c^2\right)(bx+a)^{5+n}}{b^9\,(5+n)}-\frac{2a\,d^2\left(28a^2d+9b^2c\right)(bx+a)^{6+n}}{b^9\,(6+n)}$$
$$+\frac{d^2\left(28a^2d+3b^2c\right)(bx+a)^{7+n}}{b^9\,(7+n)}-\frac{8a\,d^3(bx+a)^{8+n}}{b^9\,(8+n)}+\frac{d^3(bx+a)^{9+n}}{b^9\,(9+n)}$$

command

```
integrate(x**2*(b*x+a)**n*(d*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

23.2 Problem number 360

$$\int x(a+bx)^n\left(c+dx^2\right)^3\,dx$$

Optimal antiderivative

$$-\frac{a\left(a^2d+b^2c\right)^3(bx+a)^{1+n}}{b^8(1+n)}+\frac{\left(a^2d+b^2c\right)^2\left(7a^2d+b^2c\right)(bx+a)^{2+n}}{b^8(2+n)}$$
$$-\frac{3ad\left(a^2d+b^2c\right)\left(7a^2d+3b^2c\right)(bx+a)^{3+n}}{b^8(3+n)}$$
$$+\frac{d\left(35a^4d^2+30a^2b^2cd+3b^4c^2\right)(bx+a)^{4+n}}{b^8(4+n)}-\frac{5a\,d^2\left(7a^2d+3b^2c\right)(bx+a)^{5+n}}{b^8(5+n)}$$
$$+\frac{3d^2\left(7a^2d+b^2c\right)(bx+a)^{6+n}}{b^8(6+n)}-\frac{7a\,d^3(bx+a)^{7+n}}{b^8(7+n)}+\frac{d^3(bx+a)^{8+n}}{b^8(8+n)}$$

command

```
integrate(x*(b*x+a)**n*(d*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

23.3 Problem number 361

$$\int (a+bx)^n \left(c+dx^2\right)^3 \, dx$$

Optimal antiderivative

$$\frac{\left(a^2d+b^2c\right)^3 (bx+a)^{1+n}}{b^7 (1+n)} - \frac{6ad\left(a^2d+b^2c\right)^2 (bx+a)^{2+n}}{b^7 (2+n)} + \frac{3d\left(a^2d+b^2c\right)\left(5a^2d+b^2c\right)(bx+a)^{3+n}}{b^7 (3+n)} - \frac{4a\,d^2\left(5a^2d+3b^2c\right)(bx+a)^{4+n}}{b^7 (4+n)} + \frac{3d^2\left(5a^2d+b^2c\right)(bx+a)^{5+n}}{b^7 (5+n)} - \frac{6a\,d^3(bx+a)^{6+n}}{b^7 (6+n)} + \frac{d^3(bx+a)^{7+n}}{b^7 (7+n)}$$

command

```
integrate((b*x+a)**n*(d*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

23.4 Problem number 430

$$\int (gx)^m (d+ex)^3 \left(a+cx^2\right)^p \, dx$$

Optimal antiderivative

$$\frac{3d\,e^2(gx)^{1+m}\left(c\,x^2+a\right)^{1+p}}{cg\,(3+m+2p)} + \frac{e^3(gx)^{2+m}\left(c\,x^2+a\right)^{1+p}}{c\,g^2\,(4+m+2p)} - \frac{d\left(3a\,e^2(1+m)-c\,d^2(3+m+2p)\right)(gx)^{1+m}\left(c\,x^2+a\right)^p \operatorname{hypergeom}\left(\left[-p,\frac{1}{2}+\frac{m}{2}\right],\left[\frac{3}{2}+\frac{m}{2}\right],-\frac{c\,x^2}{a}\right)\left(1+\frac{c\,x^2}{a}\right)^{-p}}{cg\,(1+m)\,(3+m+2p)} - \frac{e\left(a\,e^2(2+m)-3c\,d^2(4+m+2p)\right)(gx)^{2+m}\left(c\,x^2+a\right)^p \operatorname{hypergeom}\left(\left[-p,1+\frac{m}{2}\right],\left[2+\frac{m}{2}\right],-\frac{c\,x^2}{a}\right)\left(1+\frac{c\,x^2}{a}\right)^{-p}}{c\,g^2\,(2+m)\,(4+m+2p)}$$

command

```
integrate((g*x)**m*(e*x+d)**3*(c*x**2+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^{p}d^{3}g^{m}xx^{m}\Gamma\left(\frac{m}{2}+\frac{1}{2}\right){}_{2}F_{1}\left(\begin{matrix}-p,\frac{m}{2}+\frac{1}{2}\\ \frac{m}{2}+\frac{3}{2}\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}+\frac{3a^{p}d^{2}eg^{m}x^{2}x^{m}\Gamma\left(\frac{m}{2}+1\right){}_{2}F_{1}\left(\begin{matrix}-p,\frac{m}{2}+1\\ \frac{m}{2}+2\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+2\right)}+\frac{3a^{p}de^{2}g^{m}x^{3}x^{m}\Gamma\left(\frac{m}{2}+\frac{3}{2}\right){}_{2}F_{1}\left(\begin{matrix}-p,\frac{m}{2}+\frac{3}{2}\\ \frac{m}{2}+\frac{5}{2}\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}+\frac{a^{p}e^{3}g^{m}x^{4}x^{m}\Gamma\left(\frac{m}{2}+2\right){}_{2}F_{1}\left(\begin{matrix}-p,\frac{m}{2}+2\\ \frac{m}{2}+3\end{matrix}\middle|\frac{cx^{2}e^{i\pi}}{a}\right)}{2\Gamma\left(\frac{m}{2}+3\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

23.5 Problem number 589

$$\int \frac{(d+ex)^{3}\left(a+cx^{2}\right)}{\sqrt{f+gx}}\,dx$$

Optimal antiderivative

$$\frac{2(-dg+ef)^{2}\left(3ae\,g^{2}+cf(-2dg+5ef)\right)(gx+f)^{\frac{3}{2}}}{3g^{6}}-\frac{2(-dg+ef)\left(3a\,e^{2}g^{2}+c\left(d^{2}g^{2}-8defg+10e^{2}f^{2}\right)\right)(gx+f)^{\frac{5}{2}}}{5g^{6}}+\frac{2e\left(a\,e^{2}g^{2}+c\left(3d^{2}g^{2}-12defg+10e^{2}f^{2}\right)\right)(gx+f)^{\frac{7}{2}}}{7g^{6}}-\frac{2c\,e^{2}(-3dg+5ef)(gx+f)^{\frac{9}{2}}}{9g^{6}}+\frac{2c\,e^{3}(gx+f)^{\frac{11}{2}}}{11g^{6}}-\frac{2(-dg+ef)^{3}\left(a\,g^{2}+c\,f^{2}\right)\sqrt{gx+f}}{g^{6}}$$

command

```
integrate((e*x+d)**3*(c*x**2+a)/(g*x+f)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

23.6 Problem number 805

$$\int (d+ex)^3(f+gx)^n \left(a+2cdx+cex^2\right) \, dx$$

Optimal antiderivative

$$-\frac{(-dg+ef)^3 \left(a\,g^2+cf(-2dg+ef)\right)(gx+f)^{1+n}}{g^6\,(1+n)} + \frac{(-dg+ef)^2 \left(3ae\,g^2+c\left(2d^2g^2-10defg+5e^2f^2\right)\right)(gx+f)^{2+n}}{g^6\,(2+n)} - \frac{e(-dg+ef)\left(3ae\,g^2+c\left(7d^2g^2-20defg+10e^2f^2\right)\right)(gx+f)^{3+n}}{g^6\,(3+n)} + \frac{e^2\left(ae\,g^2+c\left(9d^2g^2-20defg+10e^2f^2\right)\right)(gx+f)^{4+n}}{g^6\,(4+n)} - \frac{5c\,e^3(-dg+ef)\,(gx+f)^{5+n}}{g^6\,(5+n)} + \frac{c\,e^4(gx+f)^{6+n}}{g^6\,(6+n)}$$

command

```
integrate((e*x+d)**3*(g*x+f)**n*(c*e*x**2+2*c*d*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

23.7 Problem number 925

$$\int (d+ex)^m(f+gx)^2 \left(a+bx+cx^2\right)^2 \, dx$$

Optimal antiderivative

$$\frac{\left(a\,e^2-bde+c\,d^2\right)^2(-dg+ef)^2\,(ex+d)^{1+m}}{e^7\,(1+m)} - \frac{2\left(a\,e^2-bde+c\,d^2\right)(-dg+ef)\left(cd(-3dg+2ef)-e(aeg-2bdg+bef)\right)(ex+d)^{2+m}}{e^7\,(2+m)} + \frac{\left(c^2d^2\left(15d^2g^2-20defg+6e^2f^2\right)+e^2\left(a^2e^2g^2+2abeg(-3dg+2ef)+b^2\left(6d^2g^2-6defg+e^2f^2\right)\right)+2ce\left(ae\left(6d^2g\right.\right.\right.}{e^7\,(3+m)} + \frac{2\left(b\,e^2g(aeg-2bdg+bef)-2c^2d\left(5d^2g^2-5defg+e^2f^2\right)+ce\left(2aeg(-2dg+ef)+b\left(10d^2g^2-8defg+e^2f^2\right)\right)\right)}{e^7\,(4+m)} + \frac{\left(b^2e^2g^2+2ceg(aeg-5bdg+2bef)+c^2\left(15d^2g^2-10defg+e^2f^2\right)\right)(ex+d)^{5+m}}{e^7\,(5+m)} + \frac{2cg(beg-3cdg+cef)\,(ex+d)^{6+m}}{e^7\,(6+m)} + \frac{c^2g^2(ex+d)^{7+m}}{e^7\,(7+m)}$$

command

```
integrate((e*x+d)**m*(g*x+f)**2*(c*x**2+b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

23.8 Problem number 926

$$\int (d+ex)^m(f+gx)\left(a+bx+cx^2\right)^2\,dx$$

Optimal antiderivative

$$\frac{\left(a\,e^2-bde+c\,d^2\right)^2(-dg+ef)\,(ex+d)^{1+m}}{e^6\,(1+m)}$$
$$-\frac{\left(a\,e^2-bde+c\,d^2\right)(cd(-5dg+4ef)-e(aeg-3bdg+2bef))\,(ex+d)^{2+m}}{e^6\,(2+m)}$$
$$+\frac{\left(2c^2d^2(-5dg+3ef)+b\,e^2(2aeg-3bdg+bef)+2ce(ae(-3dg+ef)-3bd(-2dg+ef))\right)(ex+d)^{3+m}}{e^6\,(3+m)}$$
$$+\frac{\left(b^2e^2g-2c^2d(-5dg+2ef)+2ce(aeg-4bdg+bef)\right)(ex+d)^{4+m}}{e^6\,(4+m)}$$
$$+\frac{c(2beg-5cdg+cef)\,(ex+d)^{5+m}}{e^6\,(5+m)}+\frac{c^2g(ex+d)^{6+m}}{e^6\,(6+m)}$$

command

```
integrate((e*x+d)**m*(g*x+f)*(c*x**2+b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

24 Test file number 38

Test folder name:

`test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.1_Quadratic/38_1.2.1.9_P-x-d+e_x-^m-a+b_x+c_x^2-^p`

24.1 Problem number 367

$$\int (d+ex)^m \left(3+2x+5x^2\right)^3 \left(2+x+3x^2-5x^3+4x^4\right)\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{\left(5d^2-2de+3e^2\right)^3\left(4d^4+5d^3e+3d^2e^2-d\,e^3+2e^4\right)(ex+d)^{1+m}}{e^{11}\left(1+m\right)}\\&-\frac{\left(5d^2-2de+3e^2\right)^2\left(200d^5+169d^4e+108d^3e^2-20d^2e^3+86d\,e^4-15e^5\right)(ex+d)^{2+m}}{e^{11}\left(2+m\right)}\\&+\frac{3\left(5d^2-2de+3e^2\right)\left(1500d^6+660d^5e+792d^4e^2+58d^3e^3+547d^2e^4-156d\,e^5+53e^6\right)(ex+d)^{3+m}}{e^{11}\left(3+m\right)}\\&-\frac{2\left(30000d^7+1050d^6e+21420d^5e^2+1715d^4e^3+9990d^3e^4-2550d^2e^5+2218d\,e^6-287e^7\right)(ex+d)^{4+m}}{e^{11}\left(4+m\right)}\\&+\frac{\left(105000d^6+3150d^5e+53550d^4e^2+3430d^3e^3+14985d^2e^4-2550d\,e^5+1109e^6\right)(ex+d)^{5+m}}{e^{11}\left(5+m\right)}\\&-\frac{6\left(21000d^5+525d^4e+7140d^3e^2+343d^2e^3+999d\,e^4-85e^5\right)(ex+d)^{6+m}}{e^{11}\left(6+m\right)}\\&+\frac{\left(105000d^4+2100d^3e+21420d^2e^2+686d\,e^3+999e^4\right)(ex+d)^{7+m}}{e^{11}\left(7+m\right)}\\&-\frac{2\left(30000d^3+450d^2e+3060d\,e^2+49e^3\right)(ex+d)^{8+m}}{e^{11}\left(8+m\right)}\\&+\frac{45\left(500d^2+5de+17e^2\right)(ex+d)^{9+m}}{e^{11}\left(9+m\right)}-\frac{25(200d+e)\,(ex+d)^{10+m}}{e^{11}\left(10+m\right)}+\frac{500(ex+d)^{11+m}}{e^{11}\left(11+m\right)}\end{aligned}$$

command

```
integrate((e*x+d)**m*(5*x**2+2*x+3)**3*(4*x**4-5*x**3+3*x**2+x+2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

24.2 Problem number 368

$$\int (d+ex)^m \left(3+2x+5x^2\right)^2 \left(2+x+3x^2-5x^3+4x^4\right) \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{\left(5d^2-2de+3e^2\right)^2 \left(4d^4+5d^3e+3d^2e^2-d\,e^3+2e^4\right)(ex+d)^{1+m}}{e^9\,(1+m)} \\
&- \frac{\left(5d^2-2de+3e^2\right)\left(160d^5+127d^4e+88d^3e^2-4d^2e^3+64d\,e^4-11e^5\right)(ex+d)^{2+m}}{e^9\,(2+m)} \\
&+ \frac{\left(2800d^6+945d^5e+1665d^4e^2+370d^3e^3+888d^2e^4-195d\,e^5+107e^6\right)(ex+d)^{3+m}}{e^9\,(3+m)} \\
&- \frac{\left(5600d^5+1575d^4e+2220d^3e^2+370d^2e^3+592d\,e^4-65e^5\right)(ex+d)^{4+m}}{e^9\,(4+m)} \\
&+ \frac{\left(7000d^4+1575d^3e+1665d^2e^2+185d\,e^3+148e^4\right)(ex+d)^{5+m}}{e^9\,(5+m)} \\
&- \frac{\left(5600d^3+945d^2e+666d\,e^2+37e^3\right)(ex+d)^{6+m}}{e^9\,(6+m)} \\
&+ \frac{\left(2800d^2+315de+111e^2\right)(ex+d)^{7+m}}{e^9\,(7+m)} - \frac{5(160d+9e)\,(ex+d)^{8+m}}{e^9\,(8+m)} + \frac{100(ex+d)^{9+m}}{e^9\,(9+m)}
\end{aligned}$$

command

```
integrate((e*x+d)**m*(5*x**2+2*x+3)**2*(4*x**4-5*x**3+3*x**2+x+2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

24.3 Problem number 369

$$\int (d+ex)^m \left(3+2x+5x^2\right) \left(2+x+3x^2-5x^3+4x^4\right) \, dx$$

Optimal antiderivative

$$\frac{(5d^2-2de+3e^2)\left(4d^4+5d^3e+3d^2e^2-d\,e^3+2e^4\right)(ex+d)^{1+m}}{e^7\,(1+m)} - \frac{(120d^5+85d^4e+68d^3e^2+12d^2e^3+42d\,e^4-7e^5)\,(ex+d)^{2+m}}{e^7\,(2+m)} + \frac{(300d^4+170d^3e+102d^2e^2+12d\,e^3+21e^4)\,(ex+d)^{3+m}}{e^7\,(3+m)} - \frac{2(200d^3+85d^2e+34d\,e^2+2e^3)\,(ex+d)^{4+m}}{e^7\,(4+m)} + \frac{(300d^2+85de+17e^2)\,(ex+d)^{5+m}}{e^7\,(5+m)} - \frac{(120d+17e)\,(ex+d)^{6+m}}{e^7\,(6+m)} + \frac{20(ex+d)^{7+m}}{e^7\,(7+m)}$$

command

```
integrate((e*x+d)**m*(5*x**2+2*x+3)*(4*x**4-5*x**3+3*x**2+x+2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

25 Test file number 39

Test folder name:

```
test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.2_Quartic/39_1.2.2.2-d_x-
^m-a+b_x^2+c_x^4-^p
```

25.1 Problem number 317

$$\int \frac{x^{11/2}}{bx^2+cx^4}\,dx$$

Optimal antiderivative

$$\frac{2x^{\frac{5}{2}}}{5c} - \frac{b^{\frac{5}{4}}\arctan\left(1-\frac{c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{b^{\frac{1}{4}}}\right)\sqrt{2}}{2c^{\frac{9}{4}}} + \frac{b^{\frac{5}{4}}\arctan\left(1+\frac{c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{b^{\frac{1}{4}}}\right)\sqrt{2}}{2c^{\frac{9}{4}}} - \frac{b^{\frac{5}{4}}\ln\left(\sqrt{b}+x\sqrt{c}-b^{\frac{1}{4}}c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4c^{\frac{9}{4}}} + \frac{b^{\frac{5}{4}}\ln\left(\sqrt{b}+x\sqrt{c}+b^{\frac{1}{4}}c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4c^{\frac{9}{4}}} - \frac{2b\sqrt{x}}{c^2}$$

command

```
integrate(x**(11/2)/(c*x**4+b*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty} x^{\frac{5}{2}} & \text{for } b = 0 \wedge c = \\ \frac{2x^{\frac{9}{2}}}{9b} & \text{for } c = 0 \\ \frac{2x^{\frac{5}{2}}}{5c} & \text{for } b = 0 \\ -\frac{2b\sqrt{x}}{c^2} - \frac{b\sqrt[4]{-\frac{b}{c}}\log\left(\sqrt{x} - \sqrt[4]{-\frac{b}{c}}\right)}{2c^2} + \frac{b\sqrt[4]{-\frac{b}{c}}\log\left(\sqrt{x} + \sqrt[4]{-\frac{b}{c}}\right)}{2c^2} + \frac{b\sqrt[4]{-\frac{b}{c}}\operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{b}{c}}}\right)}{c^2} + \frac{2x^{\frac{5}{2}}}{5c} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

25.2 Problem number 326

$$\int \frac{1}{x^{7/2}\left(bx^2 + cx^4\right)}\,dx$$

Optimal antiderivative

$$-\frac{2}{9b\,x^{\frac{9}{2}}} + \frac{2c}{5b^2x^{\frac{5}{2}}} + \frac{c^{\frac{9}{4}}\arctan\left(1 - \frac{c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{b^{\frac{1}{4}}}\right)\sqrt{2}}{2b^{\frac{13}{4}}} - \frac{c^{\frac{9}{4}}\arctan\left(1 + \frac{c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}}{b^{\frac{1}{4}}}\right)\sqrt{2}}{2b^{\frac{13}{4}}} - \frac{c^{\frac{9}{4}}\ln\left(\sqrt{b} + x\sqrt{c} - b^{\frac{1}{4}}c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4b^{\frac{13}{4}}} + \frac{c^{\frac{9}{4}}\ln\left(\sqrt{b} + x\sqrt{c} + b^{\frac{1}{4}}c^{\frac{1}{4}}\sqrt{2}\,\sqrt{x}\right)\sqrt{2}}{4b^{\frac{13}{4}}} - \frac{2c^2}{b^3\sqrt{x}}$$

command

```
integrate(1/x**(7/2)/(c*x**4+b*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}}{x^{\frac{13}{2}}} & \text{for } b = 0 \wedge c = 0 \\ -\frac{2}{13cx^{\frac{13}{2}}} & \text{for } b = 0 \\ -\frac{2}{9bx^{\frac{9}{2}}} & \text{for } c = 0 \\ -\frac{2}{9bx^{\frac{9}{2}}} + \frac{2c}{5b^2x^{\frac{5}{2}}} - \frac{c^2 \log\left(\sqrt{x} - \sqrt[4]{-\frac{b}{c}}\right)}{2b^3\sqrt[4]{-\frac{b}{c}}} + \frac{c^2 \log\left(\sqrt{x} + \sqrt[4]{-\frac{b}{c}}\right)}{2b^3\sqrt[4]{-\frac{b}{c}}} - \frac{c^2 \operatorname{atan}\left(\frac{\sqrt{x}}{\sqrt[4]{-\frac{b}{c}}}\right)}{b^3\sqrt[4]{-\frac{b}{c}}} - \frac{2c^2}{b^3\sqrt{x}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

26 Test file number 40

Test folder name:

test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.2_Quartic/40_1.2.2.3-d+e_x^2-^m-a+b_x^2+c_x^4-^p

26.1 Problem number 284

$$\int \frac{a + bx^2 + cx^4}{(d + ex^2)^{11/2}}\, dx$$

Optimal antiderivative

$$\frac{ax}{d\,(e\,x^2+d)^{\frac{9}{2}}} + \frac{(8ae+bd)\,x^3}{3d^2\,(e\,x^2+d)^{\frac{9}{2}}} + \frac{\left(c\,d^2+2e(8ae+bd)\right)x^5}{5d^3\,(e\,x^2+d)^{\frac{9}{2}}} + \frac{4e\left(c\,d^2+2e(8ae+bd)\right)x^7}{35d^4\,(e\,x^2+d)^{\frac{9}{2}}} + \frac{8e^2\left(c\,d^2+2e(8ae+bd)\right)x^9}{315d^5\,(e\,x^2+d)^{\frac{9}{2}}}$$

command

```
integrate((c*x**4+b*x**2+a)/(e*x**2+d)**(11/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

27 Test file number 41

Test folder name:

`test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.2_Quartic/41_1.2.2.4-f_x-^m-d+e_x^2-^q-a+b_x^2+c_x^4-^p`

27.1 Problem number 55

$$\int (fx)^m\,(d+ex^2)\,(1+2x^2+x^4)^5\,dx$$

Optimal antiderivative

$$\frac{d(fx)^{1+m}}{f(1+m)}+\frac{(10d+e)\,(fx)^{3+m}}{f^3(3+m)}+\frac{5(9d+2e)\,(fx)^{5+m}}{f^5(5+m)}+\frac{15(8d+3e)\,(fx)^{7+m}}{f^7(7+m)}+\frac{30(7d+4e)\,(fx)^{9+m}}{f^9(9+m)}+\frac{42(6d+5e)\,(fx)^{11+m}}{f^{11}(11+m)}+\frac{42(5d+6e)\,(fx)^{13+m}}{f^{13}(13+m)}+\frac{30(4d+7e)\,(fx)^{15+m}}{f^{15}(15+m)}+\frac{15(3d+8e)\,(fx)^{17+m}}{f^{17}(17+m)}+\frac{5(2d+9e)\,(fx)^{19+m}}{f^{19}(19+m)}+\frac{(d+10e)\,(fx)^{21+m}}{f^{21}(21+m)}+\frac{e(fx)^{23+m}}{f^{23}(23+m)}$$

command

```
integrate((f*x)**m*(e*x**2+d)*(x**4+2*x**2+1)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

27.2 Problem number 65

$$\int (fx)^m\,(1+x^2)\,(1+2x^2+x^4)^5\,dx$$

Optimal antiderivative

$$\frac{(fx)^{1+m}}{f(1+m)}+\frac{11(fx)^{3+m}}{f^3(3+m)}+\frac{55(fx)^{5+m}}{f^5(5+m)}+\frac{165(fx)^{7+m}}{f^7(7+m)}+\frac{330(fx)^{9+m}}{f^9(9+m)}+\frac{462(fx)^{11+m}}{f^{11}(11+m)}+\frac{462(fx)^{13+m}}{f^{13}(13+m)}+\frac{330(fx)^{15+m}}{f^{15}(15+m)}+\frac{165(fx)^{17+m}}{f^{17}(17+m)}+\frac{55(fx)^{19+m}}{f^{19}(19+m)}+\frac{11(fx)^{21+m}}{f^{21}(21+m)}+\frac{(fx)^{23+m}}{f^{23}(23+m)}$$

command

```
integrate((f*x)**m*(x**2+1)*(x**4+2*x**2+1)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

28 Test file number 43

Test folder name:

```
test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.2_Quartic/43_1.2.2.6_P-x-d_x-^m-a+b_x^2+c_x^4-^p
```

28.1 Problem number 37

$$\int (dx)^m \left(A+Bx+Cx^2\right) \left(a+bx^2+cx^4\right)^3 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{a^3 A (dx)^{1+m}}{d (1+m)}+\frac{a^3 B (dx)^{2+m}}{d^2 (2+m)}+\frac{a^2 (3Ab+aC) (dx)^{3+m}}{d^3 (3+m)}+\frac{3a^2 bB (dx)^{4+m}}{d^4 (4+m)} \\
&+\frac{3a \left(A \left(ac+b^2\right)+abC\right) (dx)^{5+m}}{d^5 (5+m)}+\frac{3aB \left(ac+b^2\right) (dx)^{6+m}}{d^6 (6+m)} \\
&+\frac{\left(A \left(6abc+b^3\right)+3a \left(ac+b^2\right) C\right) (dx)^{7+m}}{d^7 (7+m)}+\frac{bB \left(6ac+b^2\right) (dx)^{8+m}}{d^8 (8+m)} \\
&+\frac{\left(3Ac \left(ac+b^2\right)+b \left(6ac+b^2\right) C\right) (dx)^{9+m}}{d^9 (9+m)}+\frac{3Bc \left(ac+b^2\right) (dx)^{10+m}}{d^{10} (10+m)} \\
&+\frac{3c \left(Abc+\left(ac+b^2\right) C\right) (dx)^{11+m}}{d^{11} (11+m)}+\frac{3bB c^2 (dx)^{12+m}}{d^{12} (12+m)} \\
&+\frac{c^2 (Ac+3bC) (dx)^{13+m}}{d^{13} (13+m)}+\frac{B c^3 (dx)^{14+m}}{d^{14} (14+m)}+\frac{c^3 C (dx)^{15+m}}{d^{15} (15+m)}
\end{aligned}$$

command

```
integrate((d*x)**m*(C*x**2+B*x+A)*(c*x**4+b*x**2+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

28.2 Problem number 38

$$\int (dx)^m \left(A+Bx+Cx^2\right)\left(a+bx^2+cx^4\right)^2\,dx$$

Optimal antiderivative

$$\frac{a^2A(dx)^{1+m}}{d\,(1+m)}+\frac{a^2B(dx)^{2+m}}{d^2\,(2+m)}+\frac{a(2Ab+aC)\,(dx)^{3+m}}{d^3\,(3+m)}+\frac{2abB(dx)^{4+m}}{d^4\,(4+m)}$$
$$+\frac{\left(A\left(2ac+b^2\right)+2abC\right)(dx)^{5+m}}{d^5\,(5+m)}+\frac{B\left(2ac+b^2\right)(dx)^{6+m}}{d^6\,(6+m)}+\frac{\left(2Abc+\left(2ac+b^2\right)C\right)(dx)^{7+m}}{d^7\,(7+m)}$$
$$+\frac{2bBc(dx)^{8+m}}{d^8\,(8+m)}+\frac{c(Ac+2bC)\,(dx)^{9+m}}{d^9\,(9+m)}+\frac{B\,c^2(dx)^{10+m}}{d^{10}\,(10+m)}+\frac{c^2C(dx)^{11+m}}{d^{11}\,(11+m)}$$

command

```
integrate((d*x)**m*(C*x**2+B*x+A)*(c*x**4+b*x**2+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

28.3 Problem number 131

$$\int x^2\left(a+bx^2+cx^4\right)^p\left(3a+b(5+2p)x^2+c(7+4p)x^4\right)\,dx$$

Optimal antiderivative

$$x^3\left(c\,x^4+b\,x^2+a\right)^{1+p}$$

command

```
integrate(x**2*(c*x**4+b*x**2+a)**p*(3*a+b*(5+2*p)*x**2+c*(7+4*p)*x**4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$ax^3\left(a+bx^2+cx^4\right)^p+bx^5\left(a+bx^2+cx^4\right)^p+cx^7\left(a+bx^2+cx^4\right)^p$$

Sympy 1.8 under Python 3.8.8 output

Timed out

28.4 Problem number 132

$$\int \frac{x^5(a+bx^2+cx^4)}{\sqrt{d-ex}\sqrt{d+ex}}\,dx$$

Optimal antiderivative

$$\frac{d^2(2a\,e^4+3b\,d^2e^2+4c\,d^4)\,(-ex+d)^{\frac{3}{2}}\,(ex+d)^{\frac{3}{2}}}{3e^{10}} - \frac{(a\,e^4+3b\,d^2e^2+6c\,d^4)\,(-ex+d)^{\frac{5}{2}}\,(ex+d)^{\frac{5}{2}}}{5e^{10}} + \frac{(b\,e^2+4c\,d^2)\,(-ex+d)^{\frac{7}{2}}\,(ex+d)^{\frac{7}{2}}}{7e^{10}} - \frac{c(-ex+d)^{\frac{9}{2}}\,(ex+d)^{\frac{9}{2}}}{9e^{10}} - \frac{d^4(a\,e^4+b\,d^2e^2+c\,d^4)\,\sqrt{-ex+d}\,\sqrt{ex+d}}{e^{10}}$$

command

```
integrate(x**5*(c*x**4+b*x**2+a)/(-e*x+d)**(1/2)/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{iad^5G_{6,6}^{6,2}\left(\begin{matrix} -\frac{9}{4},-\frac{7}{4} & -2,-2,-\frac{3}{2},1 \\ -\frac{5}{2},-\frac{9}{4},-2,-\frac{7}{4},-\frac{3}{2},0 & \end{matrix}\middle|\,\frac{d^2}{e^2x^2}\right)}{4\pi^{\frac{3}{2}}e^6} - \frac{ad^5G_{6,6}^{2,6}\left(\begin{matrix} -3,-\frac{11}{4},-\frac{5}{2},-\frac{9}{4},-2,1 & \\ -\frac{11}{4},-\frac{9}{4} & -3,-\frac{5}{2},-\frac{5}{2},0 \end{matrix}\middle|\,\frac{d^2e^{-2i\pi}}{e^2x^2}\right)}{4\pi^{\frac{3}{2}}e^6} - \frac{ibd^7G_{6,6}^{6,2}\left(\begin{matrix} -\frac{13}{4},-\frac{11}{4} & -3,-3,-\frac{5}{2},1 \\ -\frac{7}{2},-\frac{13}{4},-3,-\frac{11}{4},-\frac{5}{2},0 & \end{matrix}\middle|\,\frac{d^2}{e^2x^2}\right)}{4\pi^{\frac{3}{2}}e^8} - \frac{bd^7G_{6,6}^{2,6}\left(\begin{matrix} -4,-\frac{15}{4},-\frac{7}{2},-\frac{13}{4},-3,1 & \\ -\frac{15}{4},-\frac{13}{4} & -4,-\frac{7}{2},-\frac{7}{2},0 \end{matrix}\middle|\,\frac{d^2e^{-2i\pi}}{e^2x^2}\right)}{4\pi^{\frac{3}{2}}e^8} - \frac{icd^9G_{6,6}^{6,2}\left(\begin{matrix} -\frac{17}{4},-\frac{15}{4} & -4,-4,-\frac{7}{2},1 \\ -\frac{9}{2},-\frac{17}{4},-4,-\frac{15}{4},-\frac{7}{2},0 & \end{matrix}\middle|\,\frac{d^2}{e^2x^2}\right)}{4\pi^{\frac{3}{2}}e^{10}} - \frac{cd^9G_{6,6}^{2,6}\left(\begin{matrix} -5,-\frac{19}{4},-\frac{9}{2},-\frac{17}{4},-4,1 & \\ -\frac{19}{4},-\frac{17}{4} & -5,-\frac{9}{2},-\frac{9}{2},0 \end{matrix}\middle|\,\frac{d^2e^{-2i\pi}}{e^2x^2}\right)}{4\pi^{\frac{3}{2}}e^{10}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

29 Test file number 46

Test folder name:

test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.3_General/46_1.2.3.2-d_x-^m-a+b_x^n+c_x^-2_n-^p

29.1 Problem number 565

$$\int \frac{1}{x\left(a+bx^n+cx^{2n}\right)}\,dx$$

Optimal antiderivative

$$\frac{\ln\left(x\right)}{a}-\frac{\ln\left(a+b\,x^n+c\,x^{2n}\right)}{2an}+\frac{b\,\mathrm{arctanh}\left(\frac{b+2c\,x^n}{\sqrt{-4ac+b^2}}\right)}{an\sqrt{-4ac+b^2}}$$

command

integrate(1/x/(a+b*xn+c*x**(2*n)),x)**

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{4bcn\log\left(x\right)}{b^3n+2b^2cnx^n}-\frac{4bc\log\left(\frac{b}{2c}+x^n\right)}{b^3n+2b^2cnx^n}+\frac{4bc}{b^3n+2b^2cnx^n}+\frac{8c^2nx^n\log\left(x\right)}{b^3n+2b^2cnx^n}-\frac{8c^2x^n\log\left(\frac{b}{2c}+x^n\right)}{b^3n+2b^2cnx^n} \\ -\frac{x^{-n}}{bn}-\frac{c\log\left(x^n\right)}{b^2n}+\frac{c\log\left(\frac{b}{c}+x^n\right)}{b^2n} \\ \frac{\log\left(x\right)}{a+b+c} \\ \frac{\log\left(x\right)}{a}-\frac{\log\left(\frac{a}{b}+x^n\right)}{an} \\ -\frac{b\log\left(\frac{b}{2c}+x^n-\frac{\sqrt{-4ac+b^2}}{2c}\right)}{2an\sqrt{-4ac+b^2}}+\frac{b\log\left(\frac{b}{2c}+x^n+\frac{\sqrt{-4ac+b^2}}{2c}\right)}{2an\sqrt{-4ac+b^2}}+\frac{\log\left(x\right)}{a}-\frac{\log\left(\frac{b}{2c}+x^n-\frac{\sqrt{-4ac+b^2}}{2c}\right)}{2an}-\frac{\log\left(\frac{b}{2c}+x^n+\cdots\right.}{} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

29.2 Problem number 597

$$\int (dx)^m \left(a + bx^n + cx^{2n}\right)^2 \, dx$$

Optimal antiderivative

$$\frac{2ab\, x^{1+n} (dx)^m}{1+m+n} + \frac{(2ac+b^2)\, x^{1+2n} (dx)^m}{1+m+2n} + \frac{2bc\, x^{1+3n} (dx)^m}{1+m+3n} + \frac{c^2 x^{1+4n} (dx)^m}{1+m+4n} + \frac{a^2 (dx)^{1+m}}{d\,(1+m)}$$

command

```
integrate((d*x)**m*(a+b*x**n+c*x**(2*n))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

30 Test file number 47

Test folder name:

```
test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.3_General/47_1.2.3.3-d+e_x^n-
^q-a+b_x^n+c_x^-2_n-^p
```

30.1 Problem number 50

$$\int \frac{d + ex^n}{(a + cx^{2n})^2} \, dx$$

Optimal antiderivative

$$\frac{x(d + e\,x^n)}{2an\,(a + c\,x^{2n})} - \frac{d(1-2n)\,x \,\mathrm{hypergeom}\left(\left[1, \frac{1}{2n}\right], \left[1 + \frac{1}{2n}\right], -\frac{c\,x^{2n}}{a}\right)}{2a^2 n} - \frac{e(1-n)\,x^{1+n} \,\mathrm{hypergeom}\left(\left[1, \frac{1+n}{2n}\right], \left[\frac{3}{2} + \frac{1}{2n}\right], -\frac{c\,x^{2n}}{a}\right)}{2a^2 n\,(1+n)}$$

command

```
integrate((d+e*x**n)/(a+c*x**(2*n))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$d\left(\frac{2nx\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2n}\right)\Gamma\left(\frac{1}{2n}\right)}{a\left(8an^3\Gamma\left(1+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(1+\frac{1}{2n}\right)\right)}\right.$$
$$+\frac{2nx\Gamma\left(\frac{1}{2n}\right)}{a\left(8an^3\Gamma\left(1+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(1+\frac{1}{2n}\right)\right)}-\frac{x\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2n}\right)\Gamma\left(\frac{1}{2n}\right)}{a\left(8an^3\Gamma\left(1+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(1+\frac{1}{2n}\right)\right)}$$
$$+\frac{2cnxx^{2n}\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2n}\right)\Gamma\left(\frac{1}{2n}\right)}{a^2\cdot\left(8an^3\Gamma\left(1+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(1+\frac{1}{2n}\right)\right)}$$
$$\left.-\frac{cxx^{2n}\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2n}\right)\Gamma\left(\frac{1}{2n}\right)}{a^2\cdot\left(8an^3\Gamma\left(1+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(1+\frac{1}{2n}\right)\right)}\right)$$
$$+e\left(\frac{n^2xx^n\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2}+\frac{1}{2n}\right)\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right)}{a\left(8an^3\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)\right)}\right.$$
$$+\frac{2n^2xx^n\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right)}{a\left(8an^3\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)\right)}+\frac{2nxx^n\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right)}{a\left(8an^3\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)\right)}$$
$$-\frac{xx^n\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2}+\frac{1}{2n}\right)\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right)}{a\left(8an^3\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)\right)}$$
$$+\frac{cn^2xx^{3n}\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2}+\frac{1}{2n}\right)\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right)}{a^2\cdot\left(8an^3\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)\right)}$$
$$\left.-\frac{cxx^{3n}\Phi\left(\frac{cx^{2n}e^{i\pi}}{a},1,\frac{1}{2}+\frac{1}{2n}\right)\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right)}{a^2\cdot\left(8an^3\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)+8cn^3x^{2n}\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)\right)}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

30.2 Problem number 61

$$\int (d+ex^n)^2\left(a+cx^{2n}\right)^p\,dx$$

Optimal antiderivative

$$\frac{e^2x^{1+2n}\left(a+c\,x^{2n}\right)^p\,\mathrm{hypergeom}\left(\left[-p,1+\frac{1}{2n}\right],\left[2+\frac{1}{2n}\right],-\frac{c\,x^{2n}}{a}\right)\left(1+\frac{c\,x^{2n}}{a}\right)^{-p}}{1+2n}$$
$$+d^2x\left(a+c\,x^{2n}\right)^p\,\mathrm{hypergeom}\left(\left[-p,\frac{1}{2n}\right],\left[1+\frac{1}{2n}\right],-\frac{c\,x^{2n}}{a}\right)\left(1+\frac{c\,x^{2n}}{a}\right)^{-p}$$
$$+\frac{2de\,x^{1+n}\left(a+c\,x^{2n}\right)^p\,\mathrm{hypergeom}\left(\left[-p,\frac{1+n}{2n}\right],\left[\frac{3}{2}+\frac{1}{2n}\right],-\frac{c\,x^{2n}}{a}\right)\left(1+\frac{c\,x^{2n}}{a}\right)^{-p}}{1+n}$$

command

```
integrate((d+e*x**n)**2*(a+c*x**(2*n))**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^{p}d^{2}x\Gamma\left(\frac{1}{2n}\right){}_{2}F_{1}\left(\begin{matrix}\frac{1}{2n},-p\\1+\frac{1}{2n}\end{matrix}\middle|\frac{cx^{2n}e^{i\pi}}{a}\right)}{2n\Gamma\left(1+\frac{1}{2n}\right)}+\frac{a^{p}dexx^{n}\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right){}_{2}F_{1}\left(\begin{matrix}-p,\frac{1}{2}+\frac{1}{2n}\\\frac{3}{2}+\frac{1}{2n}\end{matrix}\middle|\frac{cx^{2n}e^{i\pi}}{a}\right)}{n\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)}+\frac{a^{p}e^{2}xx^{2n}\Gamma\left(1+\frac{1}{2n}\right){}_{2}F_{1}\left(\begin{matrix}-p,1+\frac{1}{2n}\\2+\frac{1}{2n}\end{matrix}\middle|\frac{cx^{2n}e^{i\pi}}{a}\right)}{2n\Gamma\left(2+\frac{1}{2n}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

30.3 Problem number 62

$$\int (d+ex^{n})\left(a+cx^{2n}\right)^{p}\,dx$$

Optimal antiderivative

$$dx\left(a+c\,x^{2n}\right)^{p}\operatorname{hypergeom}\left(\left[-p,\frac{1}{2n}\right],\left[1+\frac{1}{2n}\right],-\frac{c\,x^{2n}}{a}\right)\left(1+\frac{c\,x^{2n}}{a}\right)^{-p}+\frac{e\,x^{1+n}\left(a+c\,x^{2n}\right)^{p}\operatorname{hypergeom}\left(\left[-p,\frac{1+n}{2n}\right],\left[\frac{3}{2}+\frac{1}{2n}\right],-\frac{c\,x^{2n}}{a}\right)\left(1+\frac{c\,x^{2n}}{a}\right)^{-p}}{1+n}$$

command

```
integrate((d+e*x**n)*(a+c*x**(2*n))**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^{p}dx\Gamma\left(\frac{1}{2n}\right){}_{2}F_{1}\left(\begin{matrix}\frac{1}{2n},-p\\1+\frac{1}{2n}\end{matrix}\middle|\frac{cx^{2n}e^{i\pi}}{a}\right)}{2n\Gamma\left(1+\frac{1}{2n}\right)}+\frac{a^{p}exx^{n}\Gamma\left(\frac{1}{2}+\frac{1}{2n}\right){}_{2}F_{1}\left(\begin{matrix}-p,\frac{1}{2}+\frac{1}{2n}\\\frac{3}{2}+\frac{1}{2n}\end{matrix}\middle|\frac{cx^{2n}e^{i\pi}}{a}\right)}{2n\Gamma\left(\frac{3}{2}+\frac{1}{2n}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

31 Test file number 48

Test folder name:

`test_cases/1_Algebraic_functions/1.2_Trinomial_products/1.2.3_General/48_1.2.3.4-f_x-^m-d+e_x^n-^q-a+b_x^n+c_x^-2_n-^p`

31.1 Problem number 41

$$\int \frac{a+bx^3+cx^6}{(d+ex^3)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2(a\,e^2-bde+c\,d^2)\,x}{15d\,e^2\,(e\,x^3+d)^{\frac{5}{2}}}-\frac{2(-13a\,e^2-2bde+17c\,d^2)\,x}{135d^2e^2\,(e\,x^3+d)^{\frac{3}{2}}}+\frac{2(91a\,e^2+14bde+16c\,d^2)\,x}{405d^3e^2\,\sqrt{e\,x^3+d}}$$
$$+\frac{2(91a\,e^2+14bde+16c\,d^2)\left(d^{\frac{1}{3}}+e^{\frac{1}{3}}x\right)\text{EllipticF}\left(\frac{e^{\frac{1}{3}}x+d^{\frac{1}{3}}\left(1-\sqrt{3}\right)}{e^{\frac{1}{3}}x+d^{\frac{1}{3}}\left(1+\sqrt{3}\right)},i\sqrt{3}+2i\right)\left(\frac{\sqrt{6}}{2}+\frac{\sqrt{2}}{2}\right)\sqrt{\frac{d^{\frac{2}{3}}-d^{\frac{1}{3}}e^{\frac{1}{3}}\cdots}{\left(e^{\frac{1}{3}}x+d^{\frac{1}{3}}\left(1\cdots\right.\right.}}}{1215d^3e^{\frac{7}{3}}\sqrt{e\,x^3+d}\,\sqrt{\frac{d^{\frac{1}{3}}\left(d^{\frac{1}{3}}+e^{\frac{1}{3}}x\right)}{\left(e^{\frac{1}{3}}x+d^{\frac{1}{3}}\left(1+\sqrt{3}\right)\right)^2}}}$$

command

```
integrate((c*x**6+b*x**3+a)/(e*x**3+d)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{ax\Gamma\left(\frac{1}{3}\right){}_2F_1\left(\begin{matrix}\frac{1}{3},\frac{7}{2}\\\frac{4}{3}\end{matrix}\middle|\frac{ex^3e^{i\pi}}{d}\right)}{3d^{\frac{7}{2}}\Gamma\left(\frac{4}{3}\right)}+\frac{bx^4\Gamma\left(\frac{4}{3}\right){}_2F_1\left(\begin{matrix}\frac{4}{3},\frac{7}{2}\\\frac{7}{3}\end{matrix}\middle|\frac{ex^3e^{i\pi}}{d}\right)}{3d^{\frac{7}{2}}\Gamma\left(\frac{7}{3}\right)}+\frac{cx^7\Gamma\left(\frac{7}{3}\right){}_2F_1\left(\begin{matrix}\frac{7}{3},\frac{7}{2}\\\frac{10}{3}\end{matrix}\middle|\frac{ex^3e^{i\pi}}{d}\right)}{3d^{\frac{7}{2}}\Gamma\left(\frac{10}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

31.2 Problem number 130

$$\int x(b+2cx^2)\left(a+bx^2+cx^4\right)^p\,dx$$

Optimal antiderivative

$$\frac{\left(c\,x^4+b\,x^2+a\right)^{1+p}}{2+2p}$$

command

```
integrate(x*(2*c*x**2+b)*(c*x**4+b*x**2+a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a(a+bx^2+cx^4)^p}{2p+2}+\frac{bx^2(a+bx^2+cx^4)^p}{2p+2}+\frac{cx^4(a+bx^2+cx^4)^p}{2p+2} \\ \frac{\log\left(x-\frac{\sqrt{2}\sqrt{-\frac{b}{c}-\frac{\sqrt{-4ac+b^2}}{c}}}{2}\right)}{2}+\frac{\log\left(x+\frac{\sqrt{2}\sqrt{-\frac{b}{c}-\frac{\sqrt{-4ac+b^2}}{c}}}{2}\right)}{2}+\frac{\log\left(x-\frac{\sqrt{2}\sqrt{-\frac{b}{c}+\frac{\sqrt{-4ac+b^2}}{c}}}{2}\right)}{2} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

31.3 Problem number 134

$$\int x(b+2cx^2)\left(-a+bx^2+cx^4\right)^p\,dx$$

Optimal antiderivative

$$\frac{\left(c\,x^4+b\,x^2-a\right)^{1+p}}{2+2p}$$

command

```
integrate(x*(2*c*x**2+b)*(c*x**4+b*x**2-a)**p,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a(-a+bx^2+cx^4)^p}{2p+2}+\frac{bx^2(-a+bx^2+cx^4)^p}{2p+2}+\frac{cx^4(-a+bx^2+cx^4)^p}{2p+2} \\ \frac{\log\left(x-\frac{\sqrt{2}\sqrt{-\frac{b}{c}-\frac{\sqrt{4ac+b^2}}{c}}}{2}\right)}{2}+\frac{\log\left(x+\frac{\sqrt{2}\sqrt{-\frac{b}{c}-\frac{\sqrt{4ac+b^2}}{c}}}{2}\right)}{2}+\frac{\log\left(x-\frac{\sqrt{2}\sqrt{-\frac{b}{c}+\frac{\sqrt{4ac+b^2}}{c}}}{2}\right)}{2}+ \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

32 Test file number 51

Test folder name:

`test_cases/1_Algebraic_functions/1.3_Miscellaneous/51_1.3.1_Rational_functions`

32.1 Problem number 209

$$\int (a+bx)\left(1+\left(c+ax+\frac{bx^2}{2}\right)^n\right)\,dx$$

Optimal antiderivative

$$ax+\frac{b\,x^2}{2}+\frac{\left(c+ax+\frac{1}{2}b\,x^2\right)^{1+n}}{1+n}$$

command

`integrate((b*x+a)*(1+(c+a*x+1/2*b*x**2)**n),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a\left(x+\frac{\log\left(x+\frac{c}{a}\right)}{a}\right) \\ a\left(\frac{anx}{an+a}+\frac{ax(ax+c)^n}{an+a}+\frac{ax}{an+a}+\frac{c(ax+c)^n}{an+a}\right) \\ ax+\frac{bx^2}{2}+\log\left(\frac{a}{b}+x-\frac{\sqrt{a^2-2bc}}{b}\right)+\log\left(\frac{a}{b}+x+\frac{\sqrt{a^2-2bc}}{b}\right) \\ \frac{2\cdot 2^n abnx}{2\cdot 2^n bn+2\cdot 2^n b}+\frac{2\cdot 2^n abx}{2\cdot 2^n bn+2\cdot 2^n b}+\frac{2^n b^2nx^2}{2\cdot 2^n bn+2\cdot 2^n b}+\frac{2^n b^2x^2}{2\cdot 2^n bn+2\cdot 2^n b}+\frac{2abx\left(2ax+bx^2+2c\right)^n}{2\cdot 2^n bn+2\cdot 2^n b}+\frac{b^2x^2\left(2ax+bx^2+2c\right)^n}{2\cdot 2^n bn+2\cdot 2^n b}+\frac{2bc\left(2ax+bx^2+2c\right)^n}{2\cdot 2^n bn+2\cdot 2^n b} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

32.2 Problem number 217

$$\int \left(bx+cx^2\right)\left(1+\left(\frac{bx^2}{2}+\frac{cx^3}{3}\right)^n\right)\,dx$$

Optimal antiderivative

$$\frac{b\,x^2}{2}+\frac{c\,x^3}{3}+\frac{\left(\frac{1}{2}b\,x^2+\frac{1}{3}c\,x^3\right)^{1+n}}{1+n}$$

command

`integrate((c*x**2+b*x)*(1+(1/2*b*x**2+1/3*c*x**3)**n),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{3\cdot 6^n bnx^2}{6\cdot 6^n n+6\cdot 6^n} + \frac{3\cdot 6^n bx^2}{6\cdot 6^n n+6\cdot 6^n} + \frac{2\cdot 6^n cnx^3}{6\cdot 6^n n+6\cdot 6^n} + \frac{2\cdot 6^n cx^3}{6\cdot 6^n n+6\cdot 6^n} + \frac{3bx^2(3bx^2+2cx^3)^n}{6\cdot 6^n n+6\cdot 6^n} + \frac{2cx^3(3bx^2+2cx^3)^n}{6\cdot 6^n n+6\cdot 6^n} & \text{for } n \neq -1 \\ \frac{bx^2}{2} + \frac{cx^3}{3} + 2\log(x) + \log\left(\frac{3b}{2c} + x\right) & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

32.3 Problem number 255

$$\int \frac{5+x+3x^2+2x^3}{x^2(2+x+5x^2+x^3+2x^4)}\,dx$$

Optimal antiderivative

$$\frac{-35+9i\sqrt{7}}{28x} + \frac{-35-9i\sqrt{7}}{28x} - \frac{3\ln(x)\left(7-11i\sqrt{7}\right)}{56} + \frac{3\ln\left(4i+4ix^2+x\left(i+\sqrt{7}\right)\right)\left(7-11i\sqrt{7}\right)}{112} - \frac{3\ln(x)\left(7+11i\sqrt{7}\right)}{56} + \frac{3\ln\left(4i+4ix^2+x\left(i-\sqrt{7}\right)\right)\left(7+11i\sqrt{7}\right)}{112} + \frac{11\,\mathrm{arctanh}\left(\frac{i+8ix-\sqrt{7}}{\sqrt{70-2i\sqrt{7}}}\right)\left(9+5i\sqrt{7}\right)}{4\sqrt{490-14i\sqrt{7}}} - \frac{11\,\mathrm{arctanh}\left(\frac{i+8ix+\sqrt{7}}{\sqrt{70+2i\sqrt{7}}}\right)\left(9-5i\sqrt{7}\right)}{4\sqrt{490+14i\sqrt{7}}}$$

command

```
integrate((2*x**3+3*x**2+x+5)/x**2/(2*x**4+x**3+5*x**2+x+2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33 Test file number 52

Test folder name:

`test_cases/1_Algebraic_functions/1.3_Miscellaneous/52_1.3.2_Algebraic_functions`

33.1 Problem number 178

$$\int x^2(a+bx)^n \left(c+dx^3\right)^2 \, dx$$

Optimal antiderivative

$$\frac{a^2\left(-a^3d+b^3c\right)^2 (bx+a)^{1+n}}{b^9\,(1+n)}-\frac{2a\left(-4a^3d+b^3c\right)\left(-a^3d+b^3c\right)(bx+a)^{2+n}}{b^9\,(2+n)}+\frac{\left(28a^6d^2-20a^3b^3cd+b^6c^2\right)(bx+a)^{3+n}}{b^9\,(3+n)}+\frac{4a^2d\left(-14a^3d+5b^3c\right)(bx+a)^{4+n}}{b^9\,(4+n)}-\frac{10ad\left(-7a^3d+b^3c\right)(bx+a)^{5+n}}{b^9\,(5+n)}+\frac{2d\left(-28a^3d+b^3c\right)(bx+a)^{6+n}}{b^9\,(6+n)}+\frac{28a^2d^2(bx+a)^{7+n}}{b^9\,(7+n)}-\frac{8a\,d^2(bx+a)^{8+n}}{b^9\,(8+n)}+\frac{d^2(bx+a)^{9+n}}{b^9\,(9+n)}$$

command

```
integrate(x**2*(b*x+a)**n*(d*x**3+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33.2 Problem number 179

$$\int x(a+bx)^n \left(c+dx^3\right)^2 \, dx$$

Optimal antiderivative

$$-\frac{a\left(-a^3d+b^3c\right)^2 (bx+a)^{1+n}}{b^8\,(1+n)}+\frac{\left(-7a^3d+b^3c\right)\left(-a^3d+b^3c\right)(bx+a)^{2+n}}{b^8\,(2+n)}+\frac{3a^2d\left(-7a^3d+4b^3c\right)(bx+a)^{3+n}}{b^8\,(3+n)}-\frac{ad\left(-35a^3d+8b^3c\right)(bx+a)^{4+n}}{b^8\,(4+n)}+\frac{d\left(-35a^3d+2b^3c\right)(bx+a)^{5+n}}{b^8\,(5+n)}+\frac{21a^2d^2(bx+a)^{6+n}}{b^8\,(6+n)}-\frac{7a\,d^2(bx+a)^{7+n}}{b^8\,(7+n)}+\frac{d^2(bx+a)^{8+n}}{b^8\,(8+n)}$$

command

```
integrate(x*(b*x+a)**n*(d*x**3+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33.3 Problem number 182

$$\int x^2(a+bx)^n \left(c+dx^3\right)^3 \, dx$$

Optimal antiderivative

$$\frac{a^2\left(-a^3d+b^3c\right)^3 (bx+a)^{1+n}}{b^{12}\,(1+n)}-\frac{a\left(-11a^3d+2b^3c\right)\left(-a^3d+b^3c\right)^2 (bx+a)^{2+n}}{b^{12}\,(2+n)}$$
$$+\frac{\left(-a^3d+b^3c\right)\left(55a^6d^2-29a^3b^3cd+b^6c^2\right)(bx+a)^{3+n}}{b^{12}\,(3+n)}$$
$$+\frac{3a^2d\left(55a^6d^2-56a^3b^3cd+10b^6c^2\right)(bx+a)^{4+n}}{b^{12}\,(4+n)}$$
$$-\frac{15ad\left(22a^6d^2-14a^3b^3cd+b^6c^2\right)(bx+a)^{5+n}}{b^{12}\,(5+n)}$$
$$+\frac{3d\left(154a^6d^2-56a^3b^3cd+b^6c^2\right)(bx+a)^{6+n}}{b^{12}\,(6+n)}+\frac{42a^2d^2\left(-11a^3d+2b^3c\right)(bx+a)^{7+n}}{b^{12}\,(7+n)}$$
$$-\frac{6a\,d^2\left(-55a^3d+4b^3c\right)(bx+a)^{8+n}}{b^{12}\,(8+n)}+\frac{3d^2\left(-55a^3d+b^3c\right)(bx+a)^{9+n}}{b^{12}\,(9+n)}$$
$$+\frac{55a^2d^3(bx+a)^{10+n}}{b^{12}\,(10+n)}-\frac{11a\,d^3(bx+a)^{11+n}}{b^{12}\,(11+n)}+\frac{d^3(bx+a)^{12+n}}{b^{12}\,(12+n)}$$

command

```
integrate(x**2*(b*x+a)**n*(d*x**3+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33.4 Problem number 183

$$\int x(a+bx)^n \left(c+dx^3\right)^3 \, dx$$

Optimal antiderivative

$$-\frac{a\left(-a^3d+b^3c\right)^3 (bx+a)^{1+n}}{b^{11}(1+n)}+\frac{\left(-10a^3d+b^3c\right)\left(-a^3d+b^3c\right)^2 (bx+a)^{2+n}}{b^{11}(2+n)} \\ +\frac{9a^2d\left(-5a^3d+2b^3c\right)\left(-a^3d+b^3c\right)(bx+a)^{3+n}}{b^{11}(3+n)} \\ -\frac{3ad\left(40a^6d^2-35a^3b^3cd+4b^6c^2\right)(bx+a)^{4+n}}{b^{11}(4+n)} \\ +\frac{3d\left(70a^6d^2-35a^3b^3cd+b^6c^2\right)(bx+a)^{5+n}}{b^{11}(5+n)}+\frac{63a^2d^2\left(-4a^3d+b^3c\right)(bx+a)^{6+n}}{b^{11}(6+n)} \\ -\frac{21a\,d^2\left(-10a^3d+b^3c\right)(bx+a)^{7+n}}{b^{11}(7+n)}+\frac{3d^2\left(-40a^3d+b^3c\right)(bx+a)^{8+n}}{b^{11}(8+n)} \\ +\frac{45a^2d^3(bx+a)^{9+n}}{b^{11}(9+n)}-\frac{10a\,d^3(bx+a)^{10+n}}{b^{11}(10+n)}+\frac{d^3(bx+a)^{11+n}}{b^{11}(11+n)}$$

command

```
integrate(x*(b*x+a)**n*(d*x**3+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33.5 Problem number 184

$$\int (a+bx)^n \left(c+dx^3\right)^3 \, dx$$

Optimal antiderivative

$$\frac{\left(-a^3d+b^3c\right)^3 (bx+a)^{1+n}}{b^{10}(1+n)}+\frac{9a^2d\left(-a^3d+b^3c\right)^2 (bx+a)^{2+n}}{b^{10}(2+n)} \\ -\frac{9ad\left(-4a^3d+b^3c\right)\left(-a^3d+b^3c\right)(bx+a)^{3+n}}{b^{10}(3+n)}+\frac{3d\left(28a^6d^2-20a^3b^3cd+b^6c^2\right)(bx+a)^{4+n}}{b^{10}(4+n)} \\ +\frac{9a^2d^2\left(-14a^3d+5b^3c\right)(bx+a)^{5+n}}{b^{10}(5+n)}-\frac{18a\,d^2\left(-7a^3d+b^3c\right)(bx+a)^{6+n}}{b^{10}(6+n)} \\ +\frac{3d^2\left(-28a^3d+b^3c\right)(bx+a)^{7+n}}{b^{10}(7+n)}+\frac{36a^2d^3(bx+a)^{8+n}}{b^{10}(8+n)}-\frac{9a\,d^3(bx+a)^{9+n}}{b^{10}(9+n)}+\frac{d^3(bx+a)^{10+n}}{b^{10}(10+n)}$$

command

```
integrate((b*x+a)**n*(d*x**3+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33.6 Problem number 185

$$\int \frac{(a+bx)^n (c+dx^3)^3}{x}\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{a^2d(a^6d^2-3a^3b^3cd+3b^6c^2)\,(bx+a)^{1+n}}{b^9\,(1+n)}-\frac{ad(8a^6d^2-15a^3b^3cd+6b^6c^2)\,(bx+a)^{2+n}}{b^9\,(2+n)}\\&+\frac{d(28a^6d^2-30a^3b^3cd+3b^6c^2)\,(bx+a)^{3+n}}{b^9\,(3+n)}+\frac{2a^2d^2\,(-28a^3d+15b^3c)\,(bx+a)^{4+n}}{b^9\,(4+n)}\\&-\frac{5a\,d^2\,(-14a^3d+3b^3c)\,(bx+a)^{5+n}}{b^9\,(5+n)}+\frac{d^2\,(-56a^3d+3b^3c)\,(bx+a)^{6+n}}{b^9\,(6+n)}\\&+\frac{28a^2d^3(bx+a)^{7+n}}{b^9\,(7+n)}-\frac{8a\,d^3(bx+a)^{8+n}}{b^9\,(8+n)}+\frac{d^3(bx+a)^{9+n}}{b^9\,(9+n)}\\&-\frac{c^3(bx+a)^{1+n}\,\mathrm{hypergeom}\left([1,1+n]\,,[2+n]\,,1+\frac{bx}{a}\right)}{a\,(1+n)}\end{aligned}$$

command

```
integrate((b*x+a)**n*(d*x**3+c)**3/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33.7 Problem number 249

$$\int x^7 \left(c\sqrt{a+bx^2}\right)^{3/2} dx$$

Optimal antiderivative

$$-\frac{2a^3(b\,x^2+a)\left(c\sqrt{b\,x^2+a}\right)^{\frac{3}{2}}}{7b^4}+\frac{6a^2(b\,x^2+a)^2\left(c\sqrt{b\,x^2+a}\right)^{\frac{3}{2}}}{11b^4}-\frac{2a(b\,x^2+a)^3\left(c\sqrt{b\,x^2+a}\right)^{\frac{3}{2}}}{5b^4}+\frac{2(b\,x^2+a)^4\left(c\sqrt{b\,x^2+a}\right)^{\frac{3}{2}}}{19b^4}$$

command

```
integrate(x**7*(c*(b*x**2+a)**(1/2))**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{256a^4\left(c\sqrt{a+bx^2}\right)^{\frac{3}{2}}}{7315b^4}+\frac{192a^3x^2\left(c\sqrt{a+bx^2}\right)^{\frac{3}{2}}}{7315b^3}-\frac{24a^2x^4\left(c\sqrt{a+bx^2}\right)^{\frac{3}{2}}}{1045b^2}+\frac{2ax^6\left(c\sqrt{a+bx^2}\right)^{\frac{3}{2}}}{95b}+\frac{2x^8\left(c\sqrt{a+bx^2}\right.}{19} \\ \frac{x^8\left(\sqrt{a}\,c\right)^{\frac{3}{2}}}{8} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.8 Problem number 420

$$\int x^2\left(\sqrt{1-x}+\sqrt{1+x}\right)^2 dx$$

Optimal antiderivative

$$\frac{2x^3}{3}+\frac{\arcsin(x)}{4}-\frac{x\sqrt{-x^2+1}}{4}+\frac{x^3\sqrt{-x^2+1}}{2}$$

command

```
integrate(x**2*((1-x)**(1/2)+(1+x)**(1/2))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{x^4}{4}+\frac{x^3}{3}+\frac{(x+1)^4}{4}-\frac{2(x+1)^3}{3}+\frac{(x+1)^2}{2}$$
$$+4\left(\begin{cases}\frac{x\sqrt{1-x}\sqrt{x+1}}{4}+\frac{\operatorname{asin}\left(\frac{\sqrt{2}\sqrt{x+1}}{2}\right)}{2} & \text{for } \sqrt{x+1}>-\sqrt{2}\wedge\sqrt{x+1}<\sqrt{2}\end{cases}\right)$$
$$-8\left(\begin{cases}\frac{x\sqrt{1-x}\sqrt{x+1}}{4}-\frac{(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{6}+\frac{\operatorname{asin}\left(\frac{\sqrt{2}\sqrt{x+1}}{2}\right)}{2} & \text{for } \sqrt{x+1}>-\sqrt{2}\wedge\sqrt{x+1}<\sqrt{2}\end{cases}\right)$$
$$+4\left(\begin{cases}\frac{x\sqrt{1-x}\sqrt{x+1}}{4}-\frac{(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{3}-\frac{\sqrt{1-x}\sqrt{x+1}\left(-5x-2(x+1)^3+6(x+1)^2-4\right)}{16}+\frac{5\operatorname{asin}\left(\frac{\sqrt{2}\sqrt{x+1}}{2}\right)}{8} & \text{for }\sqrt{\right.\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.9 Problem number 445

$$\int x^2\left(-\sqrt{1-x}-\sqrt{1+x}\right)\left(\sqrt{1-x}+\sqrt{1+x}\right)dx$$

Optimal antiderivative

$$-\frac{2x^3}{3}-\frac{\arcsin(x)}{4}+\frac{x\sqrt{-x^2+1}}{4}-\frac{x^3\sqrt{-x^2+1}}{2}$$

command

```
integrate(x**2*(-(1-x)**(1/2)-(1+x)**(1/2))*((1-x)**(1/2)+(1+x)**(1/2)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{x^4}{4}-\frac{x^3}{3}-\frac{(x+1)^4}{4}+\frac{2(x+1)^3}{3}-\frac{(x+1)^2}{2}$$
$$-4\left(\begin{cases}\frac{x\sqrt{1-x}\sqrt{x+1}}{4}+\frac{\operatorname{asin}\left(\frac{\sqrt{2}\sqrt{x+1}}{2}\right)}{2} & \text{for } \sqrt{x+1}>-\sqrt{2}\wedge\sqrt{x+1}<\sqrt{2}\end{cases}\right)$$
$$+8\left(\begin{cases}\frac{x\sqrt{1-x}\sqrt{x+1}}{4}-\frac{(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{6}+\frac{\operatorname{asin}\left(\frac{\sqrt{2}\sqrt{x+1}}{2}\right)}{2} & \text{for } \sqrt{x+1}>-\sqrt{2}\wedge\sqrt{x+1}<\sqrt{2}\end{cases}\right)$$
$$-4\left(\begin{cases}\frac{x\sqrt{1-x}\sqrt{x+1}}{4}-\frac{(1-x)^{\frac{3}{2}}(x+1)^{\frac{3}{2}}}{3}-\frac{\sqrt{1-x}\sqrt{x+1}\left(-5x-2(x+1)^3+6(x+1)^2-4\right)}{16}+\frac{5\operatorname{asin}\left(\frac{\sqrt{2}\sqrt{x+1}}{2}\right)}{8} & \text{for }\ldots\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.10 Problem number 486

$$\int (a+x^2)\left(x+\sqrt{a+x^2}\right)^n dx$$

Optimal antiderivative

$$-\frac{a^3\left(x+\sqrt{x^2+a}\right)^{-3+n}}{8(3-n)}-\frac{3a^2\left(x+\sqrt{x^2+a}\right)^{-1+n}}{8(1-n)}+\frac{3a\left(x+\sqrt{x^2+a}\right)^{1+n}}{8(1+n)}+\frac{\left(x+\sqrt{x^2+a}\right)^{3+n}}{24+8n}$$

command

```
integrate((x**2+a)*(x+(x**2+a)**(1/2))**n,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

33.11 Problem number 553

$$\int \frac{x^5}{ac+bcx^3+d\sqrt{a+bx^3}}\, dx$$

Optimal antiderivative

$$\frac{x^3}{3bc}-\frac{2\left(a\,c^2-d^2\right)\ln\left(d+c\sqrt{b\,x^3+a}\right)}{3b^2c^3}-\frac{2d\sqrt{b\,x^3+a}}{3b^2c^2}$$

command

```
integrate(x**5/(a*c+b*c*x**3+d*(b*x**3+a)**(1/2)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2\left(\frac{a+bx^3}{6bc}-\frac{d\sqrt{a+bx^3}}{3bc^2}-\frac{\left(ac^2-d^2\right)\left(\begin{cases}\frac{\sqrt{a+bx^3}}{d} & \text{for}\ c=0\\ \frac{\log\left(c\sqrt{a+bx^3}+d\right)}{c} & \text{otherwise}\end{cases}\right)}{3bc^2}\right)}{b} & \text{for}\ b\neq 0\\ \frac{x^6}{2\cdot\left(3\sqrt{a}\,d+3ac\right)} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.12 Problem number 554

$$\int \frac{x^2}{ac+bcx^3+d\sqrt{a+bx^3}}\,dx$$

Optimal antiderivative

$$\frac{2\ln\left(d+c\sqrt{b\,x^3+a}\right)}{3bc}$$

command

```
integrate(x**2/(a*c+b*c*x**3+d*(b*x**3+a)**(1/2)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2\left(\begin{cases}\frac{\sqrt{a+bx^3}}{d} & \text{for } c=0\\ \frac{\log\left(c\sqrt{a+bx^3}+d\right)}{c} & \text{otherwise}\end{cases}\right)}{3b}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.13 Problem number 555

$$\int \frac{1}{x\left(ac+bcx^3+d\sqrt{a+bx^3}\right)}\,dx$$

Optimal antiderivative

$$\frac{c\ln(x)}{a\,c^2-d^2}-\frac{2c\ln\left(d+c\sqrt{b\,x^3+a}\right)}{3\,(a\,c^2-d^2)}+\frac{2d\,\mathrm{arctanh}\left(\frac{\sqrt{b\,x^3+a}}{\sqrt{a}}\right)}{3\,(a\,c^2-d^2)\sqrt{a}}$$

command

```
integrate(1/x/(a*c+b*c*x**3+d*(b*x**3+a)**(1/2)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2c^2\left(\begin{cases}\frac{\sqrt{a+bx^3}}{d} & \text{for } c=0\\ \frac{\log\left(c\sqrt{a+bx^3}+d\right)}{c} & \text{otherwise}\end{cases}\right)}{3\left(ac^2-d^2\right)}-\frac{2\left(-\frac{c\log\left(-bx^3\right)}{2}+\frac{d\,\text{atan}\left(\frac{\sqrt{a+bx^3}}{\sqrt{-a}}\right)}{\sqrt{-a}}\right)}{3\left(ac^2-d^2\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.14 Problem number 624

$$\int \frac{\left(a+b\sqrt{c+dx}\right)^2}{x^3}\,dx$$

Optimal antiderivative

$$\frac{ab\,d^2\,\text{arctanh}\left(\frac{\sqrt{dx+c}}{\sqrt{c}}\right)}{2c^{\frac{3}{2}}}-\frac{bd\left(bc+a\sqrt{dx+c}\right)}{2cx}-\frac{\left(a+b\sqrt{dx+c}\right)^2}{2x^2}$$

command

```
integrate((a+b*(d*x+c)**(1/2))**2/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^2}{2x^2}-\frac{20abc^2d^2\sqrt{c+dx}}{-8c^4-16c^3dx+8c^2\left(c+dx\right)^2}+\frac{12abcd^2(c+dx)^{\frac{3}{2}}}{-8c^4-16c^3dx+8c^2\left(c+dx\right)^2}$$
$$+\frac{3abcd^2\sqrt{\frac{1}{c^5}}\log\left(-c^3\sqrt{\frac{1}{c^5}}+\sqrt{c+dx}\right)}{4}$$
$$-\frac{3abcd^2\sqrt{\frac{1}{c^5}}\log\left(c^3\sqrt{\frac{1}{c^5}}+\sqrt{c+dx}\right)}{4}-abd^2\sqrt{\frac{1}{c^3}}\log\left(-c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)$$
$$+abd^2\sqrt{\frac{1}{c^3}}\log\left(c^2\sqrt{\frac{1}{c^3}}+\sqrt{c+dx}\right)-\frac{2abd\sqrt{c+dx}}{cx}-\frac{b^2c}{2x^2}-\frac{b^2d}{x}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.15 Problem number 675

$$\int \frac{\sqrt{-1+\frac{1}{x^2}}\,(-1+x^2)^3}{x}\,dx$$

Optimal antiderivative

$$-\frac{35\left(-1+\frac{1}{x^2}\right)^{\frac{3}{2}} x^2}{48}-\frac{7\left(-1+\frac{1}{x^2}\right)^{\frac{5}{2}} x^4}{24}-\frac{\left(-1+\frac{1}{x^2}\right)^{\frac{7}{2}} x^6}{6}-\frac{35\arctan\left(\sqrt{-1+\frac{1}{x^2}}\right)}{16}+\frac{35\sqrt{-1+\frac{1}{x^2}}}{16}$$

command

```
integrate((x**2-1)**3*(-1+1/x**2)**(1/2)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{x^6\left(-1+\frac{1}{x^2}\right)^{\frac{3}{2}}}{6}-\frac{5x^4\sqrt{-1+\frac{1}{x^2}}\cdot\left(2-\frac{1}{x^2}\right)}{16}+\frac{3x^2\sqrt{-1+\frac{1}{x^2}}}{2}+\sqrt{-1+\frac{1}{x^2}}-\frac{35\,\mathrm{atan}\left(\sqrt{-1+\frac{1}{x^2}}\right)}{16}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.16 Problem number 690

$$\int \frac{x(1+a+a^2+x^2+ax^2+bx^2+2abx^2+bx^4+b^2x^4)}{(1+x^2)\,(a+bx^2)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{1}{3b\,(b\,x^2+a)^{\frac{3}{2}}}-\frac{\operatorname{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a-b}}\right)}{\sqrt{a-b}}-\frac{1}{b\sqrt{b\,x^2+a}}$$

command

```
integrate(x*(b**2*x**4+b*x**4+2*a*b*x**2+a*x**2+b*x**2+a**2+x**2+a+1)/(x**2+1)/(b*x**2+a)**(5
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\operatorname{atan}\left(\frac{\sqrt{a+bx^2}}{\sqrt{-a+b}}\right)}{\sqrt{-a+b}}-\frac{1}{b\sqrt{a+bx^2}}-\frac{1}{3b\left(a+bx^2\right)^{\frac{3}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

33.17 Problem number 1015

$$\int \frac{-\sqrt{-4+x}-4\sqrt{-1+x}+\sqrt{-4+x}\,x+\sqrt{-1+x}\,x}{\left(1+\sqrt{-4+x}+\sqrt{-1+x}\right)\left(4-5x+x^2\right)}\,dx$$

Optimal antiderivative

$$2\ln\left(1+\sqrt{-4+x}+\sqrt{-1+x}\right)$$

command

```
integrate((-(-4+x)**(1/2)+x*(-4+x)**(1/2)-4*(-1+x)**(1/2)+x*(-1+x)**(1/2))/(x**2-5*x+4)/(1+(-
4+x)**(1/2)+(-1+x)**(1/2)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$2\log\left(\sqrt{x-4}+\sqrt{x-1}+1\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

34 Test file number 53

Test folder name:

`test_cases/2_Exponentials/53_2.1_u-F^-c-a+b_x-^n`

34.1 Problem number 31

$$\int F^{a+bx}x^{5/2}\,dx$$

Optimal antiderivative

$$-\frac{5F^{bx+a}x^{\frac{3}{2}}}{2b^2\ln\left(F\right)^2}+\frac{F^{bx+a}x^{\frac{5}{2}}}{b\ln\left(F\right)}-\frac{15F^a\operatorname{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln\left(F\right)}\right)\sqrt{\pi}}{8b^{\frac{7}{2}}\ln\left(F\right)^{\frac{7}{2}}}+\frac{15F^{bx+a}\sqrt{x}}{4b^3\ln\left(F\right)^3}$$

command

`integrate(F**(b*x+a)*x**(5/2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{4F^aF^{bx}bx^{\frac{9}{2}}\log(F)}{63}+\frac{2F^aF^{bx}x^{\frac{7}{2}}}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

34.2 Problem number 37

$$\int \frac{F^{a+bx}}{x^{7/2}}\,dx$$

Optimal antiderivative

$$-\frac{2F^{bx+a}}{5x^{\frac{5}{2}}}-\frac{4b\,F^{bx+a}\ln(F)}{15x^{\frac{3}{2}}}+\frac{8b^{\frac{5}{2}}F^a\,\mathrm{erfi}\left(\sqrt{b}\,\sqrt{x}\,\sqrt{\ln(F)}\right)\ln(F)^{\frac{5}{2}}\sqrt{\pi}}{15}-\frac{8b^2F^{bx+a}\ln(F)^2}{15\sqrt{x}}$$

command

`integrate(F**(b*x+a)/x**(7/2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{4F^aF^{bx}b\log(F)}{15x^{\frac{3}{2}}}-\frac{2F^aF^{bx}}{5x^{\frac{5}{2}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35 Test file number 55

Test folder name:

`test_cases/2_Exponentials/55_2.3_Exponential_functions`

35.1 Problem number 13

$$\int F^{c+dx}\left(a+bF^{c+dx}\right)^n\,dx$$

Optimal antiderivative

$$\frac{\left(a+b\,F^{dx+c}\right)^{1+n}}{bd\,(1+n)\ln(F)}$$

command

`integrate(F**(d*x+c)*(a+b*F**(d*x+c))**n,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\begin{cases} (a+b)^n\,(c+dx) & \text{for}\ \log(F)=0 \\ \frac{\begin{cases} F^{c+dx}a^n & \text{for}\ b=0 \\ \frac{\begin{cases} \frac{\left(F^{c+dx}b+a\right)^{n+1}}{n+1} & \text{for}\ n\neq -1 \\ \log\left(F^{c+dx}b+a\right) & \text{otherwise} \end{cases}}{b} & \text{otherwise} \end{cases}}{\log(F)} & \text{otherwise} \end{cases}}{d} & \text{for}\ d\neq 0 \\ F^c x(F^c b+a)^n & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.2 Problem number 16

$$\int \left(F^{e(c+dx)}\right)^n\left(a+b\left(F^{e(c+dx)}\right)^n\right)^p\,dx$$

Optimal antiderivative

$$\frac{\left(a+b\left(F^{e(dx+c)}\right)^n\right)^{1+p}}{bden\,(1+p)\ln(F)}$$

command

`integrate((F**(e*(d*x+c)))**n*(a+b*(F**(e*(d*x+c)))**n)**p,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} x(a+b(F^{ce})^n)^p\,(F^{ce})^n & \text{for } d=0 \\ x(a+b)^p & \text{for } e=0 \vee n=0 \vee \log(F)=0 \\ \frac{\begin{cases} a^p\left(F^{e(c+dx)}\right)^n & \text{for } b=0 \\ \frac{\begin{cases} \frac{\left(a+b\left(F^{e(c+dx)}\right)^n\right)^{p+1}}{p+1} & \text{for } p\neq -1 \\ \log\left(a+b\left(F^{e(c+dx)}\right)^n\right) & \text{otherwise} \end{cases}}{b} & \text{otherwise} \end{cases}}{den\log(F)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.3 Problem number 183

$$\int f^{a+bx^n}x^{-1+3n}\,dx$$

Optimal antiderivative

$$\frac{2f^{a+b\,x^n}}{b^3n\ln(f)^3}-\frac{2f^{a+b\,x^n}x^n}{b^2n\ln(f)^2}+\frac{f^{a+b\,x^n}x^{2n}}{bn\ln(f)}$$

command

```
integrate(f**(a+b*x**n)*x**(-1+3*n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{bf^af^{bx^n}x^{4n}\log(f)}{12n}+\frac{f^af^{bx^n}x^{3n}}{3n} & \text{for } n\neq 0 \\ f^{a+b}\log(x) & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.4 Problem number 184

$$\int f^{a+bx^n} x^{-1+2n}\, dx$$

Optimal antiderivative

$$-\frac{f^{a+b\,x^n}}{b^2 n \ln(f)^2}+\frac{f^{a+b\,x^n} x^n}{bn \ln(f)}$$

command

```
integrate(f**(a+b*x**n)*x**(-1+2*n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{b f^a f^{bx^n} x^{3n} \log(f)}{6n}+\frac{f^a f^{bx^n} x^{2n}}{2n} & \text{for } n \neq 0 \\ f^{a+b} \log(x) & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.5 Problem number 189

$$\int f^{a+bx^n} x^{-1+\frac{5n}{2}}\, dx$$

Optimal antiderivative

$$-\frac{3 f^{a+b\,x^n} x^{\frac{n}{2}}}{2 b^2 n \ln(f)^2}+\frac{f^{a+b\,x^n} x^{\frac{3n}{2}}}{bn \ln(f)}+\frac{3 f^a \operatorname{erfi}\left(x^{\frac{n}{2}} \sqrt{b}\, \sqrt{\ln(f)}\right) \sqrt{\pi}}{4 b^{\frac{5}{2}} n \ln(f)^{\frac{5}{2}}}$$

command

```
integrate(f**(a+b*x**n)*x**(-1+5/2*n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{4 b f^a f^{bx^n} x^{\frac{7n}{2}} \log(f)}{35n}+\frac{2 f^a f^{bx^n} x^{\frac{5n}{2}}}{5n} & \text{for } n \neq 0 \\ f^{a+b} \log(x) & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.6 Problem number 190

$$\int f^{a+bx^n} x^{-1+\frac{3n}{2}}\,dx$$

Optimal antiderivative

$$\frac{f^{a+b\,x^n}x^{\frac{n}{2}}}{bn\ln\left(f\right)}-\frac{f^{a}\operatorname{erfi}\left(x^{\frac{n}{2}}\sqrt{b}\,\sqrt{\ln\left(f\right)}\right)\sqrt{\pi}}{2b^{\frac{3}{2}}n\ln\left(f\right)^{\frac{3}{2}}}$$

command

```
integrate(f**(a+b*x**n)*x**(-1+3/2*n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{4bf^{a}f^{bx^{n}}x^{\frac{5n}{2}}\log\left(f\right)}{15n}+\frac{2f^{a}f^{bx^{n}}x^{\frac{3n}{2}}}{3n} & \text{for}\ n\neq 0\\ f^{a+b}\log\left(x\right) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.7 Problem number 191

$$\int f^{a+bx^n} x^{-1+\frac{n}{2}}\,dx$$

Optimal antiderivative

$$\frac{f^{a}\operatorname{erfi}\left(x^{\frac{n}{2}}\sqrt{b}\,\sqrt{\ln\left(f\right)}\right)\sqrt{\pi}}{n\sqrt{b}\,\sqrt{\ln\left(f\right)}}$$

command

```
integrate(f**(a+b*x**n)*x**(-1+1/2*n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{4bf^{a}f^{bx^{n}}x^{\frac{3n}{2}}\log\left(f\right)}{3n}+\frac{2f^{a}f^{bx^{n}}x^{\frac{n}{2}}}{n} & \text{for}\ n\neq 0\\ f^{a+b}\log\left(x\right) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.8 Problem number 193

$$\int f^{a+bx^n} x^{-1-\frac{3n}{2}}\,dx$$

Optimal antiderivative

$$-\frac{2f^{a+b\,x^n}x^{-\frac{3n}{2}}}{3n}-\frac{4b\,f^{a+b\,x^n}\ln\left(f\right)x^{-\frac{n}{2}}}{3n}+\frac{4b^{\frac{3}{2}}f^{a}\,\mathrm{erfi}\left(x^{\frac{n}{2}}\sqrt{b}\,\sqrt{\ln\left(f\right)}\right)\ln\left(f\right)^{\frac{3}{2}}\sqrt{\pi}}{3n}$$

command

```
integrate(f**(a+b*x**n)*x**(-1-3/2*n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{4bf^{a}f^{bx^{n}}x^{-\frac{n}{2}}\log\left(f\right)}{3n}-\frac{2f^{a}f^{bx^{n}}x^{-\frac{3n}{2}}}{3n} & \text{for } n\neq 0\\ f^{a+b}\log\left(x\right) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.9 Problem number 588

$$\int F^{f\left(a+b\log^{2}\left(c(d+ex)^{n}\right)\right)}(dg+egx)^{2}\,dx$$

Optimal antiderivative

$$\frac{F^{af}g^{2}(ex+d)^{3}\,\mathrm{erfi}\left(\frac{3+2bfn\ln(F)\ln(c(ex+d)^{n})}{2n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln\left(F\right)}}\right)\sqrt{\pi}\,\mathrm{e}^{-\frac{9}{4bf\,n^{2}\ln(F)}}\left(c\left(ex+d\right)^{n}\right)^{-\frac{3}{n}}}{2en\sqrt{b}\,\sqrt{f}\,\sqrt{\ln\left(F\right)}}$$

command

```
integrate(F**(f*(a+b*ln(c*(e*x+d)**n)**2))*(e*g*x+d*g)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{2F^{af}F^{bf\log\left(c(d+ex)^{n}\right)^{2}}bd^{3}fg^{2}n^{2}\log\left(F\right)}{9e}-\frac{2F^{af}F^{bf\log\left(c(d+ex)^{n}\right)^{2}}bd^{3}fg^{2}n\log\left(F\right)\log\left(c(d+ex)^{n}\right)}{9e}+\frac{2F^{af}F^{bf\log\left(c(d+ex)^{n}\right)^{2}}bd^{2}fg^{2}n^{2}x\,\mathrm{l}}{9}\\ F^{f\left(a+b\log\left(cd^{n}\right)^{2}\right)}d^{2}g^{2}x\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.10 Problem number 592

$$\int \frac{F^{f\left(a+b\log^2\left(c(d+ex)^n\right)\right)}}{(dg+egx)^2}\,dx$$

Optimal antiderivative

$$\frac{F^{af}\left(c(ex+d)^n\right)^{\frac{1}{n}}\operatorname{erfi}\left(\frac{-1+2bfn\ln(F)\ln(c(ex+d)^n)}{2n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}\right)\sqrt{\pi}\,\mathrm{e}^{-\frac{1}{4bf\,n^2\ln(F)}}}{2e\,g^2n\,(ex+d)\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}$$

command

```
integrate(F**(f*(a+b*ln(c*(e*x+d)**n)**2))/(e*g*x+d*g)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}F^{f\left(a+b\log\left(0^n c\right)^2\right)}}{g^2x} & \text{for } d=0\wedge e= \\ \tilde{\infty}F^{f\left(a+b\log\left(0^n c\right)^2\right)}x & \text{for } d=-ex \\ \frac{F^{f\left(a+b\log\left(cd^n\right)^2\right)}x}{d^2g^2} & \text{for } e=0 \\ -\frac{2F^{af}F^{bf\log\left(c(d+ex)^n\right)^2}bfn^2\log(F)}{deg^2+e^2g^2x}-\frac{2F^{af}F^{bf\log\left(c(d+ex)^n\right)^2}bfn\log(F)\log\left(c(d+ex)^n\right)}{deg^2+e^2g^2x}-\frac{F^{af}F^{bf\log\left(c(d+ex)^n\right)^2}}{deg^2+e^2g^2x} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

35.11 Problem number 596

$$\int F^{f\left(a+b\log^2\left(c(d+ex)^n\right)\right)}(g+hx)^2\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{F^{af}h(-dh+eg)\,(ex+d)^2\operatorname{erfi}\left(\frac{1+bfn\ln(F)\ln(c(ex+d)^n)}{n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}\right)\sqrt{\pi}\,\mathrm{e}^{-\frac{1}{bf\,n^2\ln(F)}}\left(c(ex+d)^n\right)^{-\frac{2}{n}}}{e^3n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}\\&+\frac{F^{af}(-dh+eg)^2\,(ex+d)\operatorname{erfi}\left(\frac{1+2bfn\ln(F)\ln(c(ex+d)^n)}{2n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}\right)\sqrt{\pi}\,\mathrm{e}^{-\frac{1}{4bf\,n^2\ln(F)}}\left(c(ex+d)^n\right)^{-\frac{1}{n}}}{2e^3n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}\\&+\frac{F^{af}h^2(ex+d)^3\operatorname{erfi}\left(\frac{3+2bfn\ln(F)\ln(c(ex+d)^n)}{2n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}\right)\sqrt{\pi}\,\mathrm{e}^{-\frac{9}{4bf\,n^2\ln(F)}}\left(c(ex+d)^n\right)^{-\frac{3}{n}}}{2e^3n\sqrt{b}\,\sqrt{f}\,\sqrt{\ln(F)}}\end{aligned}$$

command

```
integrate(F**(f*(a+b*ln(c*(e*x+d)**n)**2))*(h*x+g)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

36 Test file number 56

Test folder name:

```
test_cases/3_Logarithms/56_3.1.2-d_x-^m-a+b_log-c_x^n-^p
```

36.1 Problem number 89

$$\int (dx)^{5/2} \left(a + b \log \left(cx^n\right)\right) \, dx$$

Optimal antiderivative

$$-\frac{4bn(dx)^{\frac{7}{2}}}{49d} + \frac{2(dx)^{\frac{7}{2}} \left(a + b \ln \left(c\, x^n\right)\right)}{7d}$$

command

```
integrate((d*x)**(5/2)*(a+b*ln(c*x**n)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2ax(dx)^{\frac{5}{2}}}{7} - \frac{4bnx(dx)^{\frac{5}{2}}}{49} + \frac{2bx(dx)^{\frac{5}{2}} \log \left(cx^n\right)}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

36.2 Problem number 95

$$\int (dx)^{5/2} (a + b \log (cx^n))^2 \, dx$$

Optimal antiderivative

$$\frac{16b^2n^2(dx)^{\frac{7}{2}}}{343d} - \frac{8bn(dx)^{\frac{7}{2}} (a + b \ln (c x^n))}{49d} + \frac{2(dx)^{\frac{7}{2}} (a + b \ln (c x^n))^2}{7d}$$

command

```
integrate((d*x)**(5/2)*(a+b*ln(c*x**n))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2a^2x(dx)^{\frac{5}{2}}}{7} - \frac{8abnx(dx)^{\frac{5}{2}}}{49} + \frac{4abx(dx)^{\frac{5}{2}} \log (cx^n)}{7} + \frac{16b^2n^2x(dx)^{\frac{5}{2}}}{343} - \frac{8b^2nx(dx)^{\frac{5}{2}} \log (cx^n)}{49} + \frac{2b^2x(dx)^{\frac{5}{2}} \log (cx^n)^2}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

36.3 Problem number 146

$$\int \frac{1}{x \log^{\frac{5}{2}} (ax^n)} \, dx$$

Optimal antiderivative

$$-\frac{2}{3n \ln (a x^n)^{\frac{3}{2}}}$$

command

```
integrate(1/x/ln(a*x**n)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2}{3n \log (ax^n)^{\frac{3}{2}}} & \text{for } n \neq 0 \\ \frac{\log (x)}{\log (a)^{\frac{5}{2}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37 Test file number 57

Test folder name:

`test_cases/3_Logarithms/57_3.1.4-f_x-^m-d+e_x^r-^q-a+b_log-c_x^n-^p`

37.1 Problem number 62

$$\int \frac{x^8(a+b\log(cx^n))}{(d+ex)^7}\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{28bdnx}{e^8}-\frac{d(341bn+280a)\,x}{10e^8}-\frac{7bn\,x^2}{e^7}-\frac{28bdx\ln(c\,x^n)}{e^8}-\frac{x^8(a+b\ln(c\,x^n))}{6e\,(ex+d)^6}\\&-\frac{x^7(8a+bn+8b\ln(c\,x^n))}{30e^2\,(ex+d)^5}-\frac{x^6(56a+15bn+56b\ln(c\,x^n))}{120e^3\,(ex+d)^4}\\&-\frac{x^5(168a+73bn+168b\ln(c\,x^n))}{180e^4\,(ex+d)^3}+\frac{x^2(280a+341bn+280b\ln(c\,x^n))}{20e^7}\\&-\frac{x^4(840a+533bn+840b\ln(c\,x^n))}{360e^5\,(ex+d)^2}-\frac{x^3(840a+743bn+840b\ln(c\,x^n))}{90e^6\,(ex+d)}\\&+\frac{d^2(280a+341bn+280b\ln(c\,x^n))\ln\left(1+\frac{ex}{d}\right)}{10e^9}+\frac{28b\,d^2n\operatorname{polylog}\left(2,-\frac{ex}{d}\right)}{e^9}\end{aligned}$$

command

```
integrate(x**8*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.2 Problem number 63

$$\int \frac{x^7(a+b\log(cx^n))}{(d+ex)^7}\,dx$$

Optimal antiderivative

$$\begin{aligned}&-\frac{7bnx}{e^7}+\frac{(223bn+140a)\,x}{20e^7}+\frac{7bx\ln(c\,x^n)}{e^7}-\frac{x^7(a+b\ln(c\,x^n))}{6e\,(ex+d)^6}-\frac{x^6(7a+bn+7b\ln(c\,x^n))}{30e^2\,(ex+d)^5}\\&-\frac{x^5(42a+13bn+42b\ln(c\,x^n))}{120e^3\,(ex+d)^4}-\frac{x^2(140a+153bn+140b\ln(c\,x^n))}{40e^6\,(ex+d)}\\&-\frac{x^4(210a+107bn+210b\ln(c\,x^n))}{360e^4\,(ex+d)^3}-\frac{x^3(420a+319bn+420b\ln(c\,x^n))}{360e^5\,(ex+d)^2}\\&-\frac{d(140a+223bn+140b\ln(c\,x^n))\ln\left(1+\frac{ex}{d}\right)}{20e^8}-\frac{7bdn\operatorname{polylog}\left(2,-\frac{ex}{d}\right)}{e^8}\end{aligned}$$

command

```
integrate(x**7*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.3 Problem number 64

$$\int \frac{x^6(a + b\log(cx^n))}{(d + ex)^7}\,dx$$

Optimal antiderivative

$$\begin{aligned} &-\frac{x^6(a+b\ln(c\,x^n))}{6e\,(ex+d)^6}-\frac{x^5(6a+bn+6b\ln(c\,x^n))}{30e^2\,(ex+d)^5} \\ &-\frac{x^2(20a+19bn+20b\ln(c\,x^n))}{40e^5\,(ex+d)^2}-\frac{x(20a+29bn+20b\ln(c\,x^n))}{20e^6\,(ex+d)} \\ &-\frac{x^4(30a+11bn+30b\ln(c\,x^n))}{120e^3\,(ex+d)^4}-\frac{x^3(60a+37bn+60b\ln(c\,x^n))}{180e^4\,(ex+d)^3} \\ &+\frac{(20a+49bn+20b\ln(c\,x^n))\ln\left(1+\frac{ex}{d}\right)}{20e^7}+\frac{bn\,\mathrm{polylog}\left(2,-\frac{ex}{d}\right)}{e^7} \end{aligned}$$

command

```
integrate(x**6*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.4 Problem number 65

$$\int \frac{x^5(a + b\log(cx^n))}{(d + ex)^7}\,dx$$

Optimal antiderivative

$$-\frac{b\,d^4n}{30e^6\,(ex+d)^5}+\frac{5b\,d^3n}{24e^6\,(ex+d)^4}-\frac{5b\,d^2n}{9e^6\,(ex+d)^3}+\frac{5bdn}{6e^6\,(ex+d)^2}-\frac{5bn}{6e^6\,(ex+d)}+\frac{x^6(a+b\ln(c\,x^n))}{6d\,(ex+d)^6}-\frac{bn\ln(ex+d)}{6d\,e^6}$$

command

```
integrate(x**5*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.5 Problem number 66

$$\int \frac{x^4(a + b\log(cx^n))}{(d + ex)^7}\,dx$$

Optimal antiderivative

$$-\frac{bn\,x^5}{30d^2\,(ex+d)^5}+\frac{b\,d^2n}{120e^5\,(ex+d)^4}-\frac{2bdn}{45e^5\,(ex+d)^3}+\frac{bn}{10e^5\,(ex+d)^2}-\frac{2bn}{15d\,e^5\,(ex+d)}+\frac{x^5(a+b\ln(c\,x^n))}{6d\,(ex+d)^6}+\frac{x^5(a+b\ln(c\,x^n))}{30d^2\,(ex+d)^5}-\frac{bn\ln(ex+d)}{30d^2e^5}$$

command

```
integrate(x**4*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.6 Problem number 67

$$\int \frac{x^3(a+b\log(cx^n))}{(d+ex)^7}\,dx$$

Optimal antiderivative

$$-\frac{b\,d^2n}{30e^4\,(ex+d)^5}+\frac{13bdn}{120e^4\,(ex+d)^4}-\frac{19bn}{180e^4\,(ex+d)^3}+\frac{bn}{120d\,e^4\,(ex+d)^2}+\frac{bn}{60d^2e^4\,(ex+d)}+\frac{bn\ln(x)}{60d^3e^4}+\frac{d^3(a+b\ln(c\,x^n))}{6e^4\,(ex+d)^6}-\frac{3d^2(a+b\ln(c\,x^n))}{5e^4\,(ex+d)^5}+\frac{3d(a+b\ln(c\,x^n))}{4e^4\,(ex+d)^4}+\frac{-a-b\ln(c\,x^n)}{3e^4\,(ex+d)^3}-\frac{bn\ln(ex+d)}{60d^3e^4}$$

command

```
integrate(x**3*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.7 Problem number 68

$$\int \frac{x^2(a+b\log(cx^n))}{(d+ex)^7}\,dx$$

Optimal antiderivative

$$\frac{bdn}{30e^3\,(ex+d)^5}-\frac{7bn}{120e^3\,(ex+d)^4}+\frac{bn}{180d\,e^3\,(ex+d)^3}+\frac{bn}{120d^2e^3\,(ex+d)^2}+\frac{bn}{60d^3e^3\,(ex+d)}+\frac{bn\ln(x)}{60d^4e^3}-\frac{d^2(a+b\ln(c\,x^n))}{6e^3\,(ex+d)^6}+\frac{2d(a+b\ln(c\,x^n))}{5e^3\,(ex+d)^5}+\frac{-a-b\ln(c\,x^n)}{4e^3\,(ex+d)^4}-\frac{bn\ln(ex+d)}{60d^4e^3}$$

command

```
integrate(x**2*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.8 Problem number 69

$$\int \frac{x(a+b\log(cx^n))}{(d+ex)^7}\,dx$$

Optimal antiderivative

$$-\frac{bn}{30e^2(ex+d)^5}+\frac{bn}{120d\,e^2(ex+d)^4}+\frac{bn}{90d^2e^2(ex+d)^3}+\frac{bn}{60d^3e^2(ex+d)^2}+\frac{bn}{30d^4e^2(ex+d)}+\frac{bn\ln(x)}{30d^5e^2}+\frac{d(a+b\ln(c\,x^n))}{6e^2(ex+d)^6}+\frac{-a-b\ln(c\,x^n)}{5e^2(ex+d)^5}-\frac{bn\ln(ex+d)}{30d^5e^2}$$

command

```
integrate(x*(a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.9 Problem number 70

$$\int \frac{a+b\log(cx^n)}{(d+ex)^7}\,dx$$

Optimal antiderivative

$$\frac{bn}{30de(ex+d)^5}+\frac{bn}{24d^2e(ex+d)^4}+\frac{bn}{18d^3e(ex+d)^3}+\frac{bn}{12d^4e(ex+d)^2}+\frac{bn}{6d^5e(ex+d)}+\frac{bn\ln(x)}{6d^6e}+\frac{-a-b\ln(c\,x^n)}{6e(ex+d)^6}-\frac{bn\ln(ex+d)}{6d^6e}$$

command

```
integrate((a+b*ln(c*x**n))/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.10 Problem number 71

$$\int \frac{a+b\log(cx^n)}{x(d+ex)^7}\,dx$$

Optimal antiderivative

$$-\frac{bn}{30d^2(ex+d)^5}-\frac{11bn}{120d^3(ex+d)^4}-\frac{37bn}{180d^4(ex+d)^3}-\frac{19bn}{40d^5(ex+d)^2}-\frac{29bn}{20d^6(ex+d)}-\frac{29bn\ln(x)}{20d^7}+\frac{a+b\ln(cx^n)}{6d(ex+d)^6}+\frac{a+b\ln(cx^n)}{5d^2(ex+d)^5}+\frac{a+b\ln(cx^n)}{4d^3(ex+d)^4}+\frac{a+b\ln(cx^n)}{3d^4(ex+d)^3}+\frac{a+b\ln(cx^n)}{2d^5(ex+d)^2}-\frac{ex(a+b\ln(cx^n))}{d^7(ex+d)}-\frac{\ln\left(1+\frac{d}{ex}\right)(a+b\ln(cx^n))}{d^7}+\frac{49bn\ln(ex+d)}{20d^7}+\frac{bn\,\mathrm{polylog}\left(2,-\frac{d}{ex}\right)}{d^7}$$

command

```
integrate((a+b*ln(c*x**n))/x/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.11 Problem number 72

$$\int \frac{a+b\log(cx^n)}{x^2(d+ex)^7}\,dx$$

Optimal antiderivative

$$-\frac{bn}{d^7x}+\frac{ben}{30d^3(ex+d)^5}+\frac{17ben}{120d^4(ex+d)^4}+\frac{79ben}{180d^5(ex+d)^3}+\frac{53ben}{40d^6(ex+d)^2}+\frac{103ben}{20d^7(ex+d)}+\frac{103ben\ln(x)}{20d^8}+\frac{-a-b\ln(cx^n)}{d^7x}-\frac{e(a+b\ln(cx^n))}{6d^2(ex+d)^6}-\frac{2e(a+b\ln(cx^n))}{5d^3(ex+d)^5}-\frac{3e(a+b\ln(cx^n))}{4d^4(ex+d)^4}-\frac{4e(a+b\ln(cx^n))}{3d^5(ex+d)^3}-\frac{5e(a+b\ln(cx^n))}{2d^6(ex+d)^2}+\frac{6e^2x(a+b\ln(cx^n))}{d^8(ex+d)}+\frac{7e\ln\left(1+\frac{d}{ex}\right)(a+b\ln(cx^n))}{d^8}-\frac{223ben\ln(ex+d)}{20d^8}-\frac{7ben\,\mathrm{polylog}\left(2,-\frac{d}{ex}\right)}{d^8}$$

command

```
integrate((a+b*ln(c*x**n))/x**2/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.12 Problem number 73

$$\int \frac{a+b\log(cx^n)}{x^3(d+ex)^7}\,dx$$

Optimal antiderivative

$$-\frac{bn}{4d^7x^2}+\frac{7ben}{d^8x}-\frac{b\,e^2n}{30d^4\,(ex+d)^5}-\frac{23b\,e^2n}{120d^5\,(ex+d)^4}-\frac{34b\,e^2n}{45d^6\,(ex+d)^3}-\frac{14b\,e^2n}{5d^7\,(ex+d)^2}-\frac{131b\,e^2n}{10d^8\,(ex+d)}-\frac{131b\,e^2n\ln(x)}{10d^9}+\frac{-a-b\ln(c\,x^n)}{2d^7x^2}+\frac{7e(a+b\ln(c\,x^n))}{d^8x}+\frac{e^2(a+b\ln(c\,x^n))}{6d^3\,(ex+d)^6}+\frac{3e^2(a+b\ln(c\,x^n))}{5d^4\,(ex+d)^5}+\frac{3e^2(a+b\ln(c\,x^n))}{2d^5\,(ex+d)^4}+\frac{10e^2(a+b\ln(c\,x^n))}{3d^6\,(ex+d)^3}+\frac{15e^2(a+b\ln(c\,x^n))}{2d^7\,(ex+d)^2}-\frac{21e^3x(a+b\ln(c\,x^n))}{d^9\,(ex+d)}-\frac{28e^2\ln\left(1+\frac{d}{ex}\right)(a+b\ln(c\,x^n))}{d^9}+\frac{341b\,e^2n\ln(ex+d)}{10d^9}+\frac{28b\,e^2n\,\mathrm{polylog}\left(2,-\frac{d}{ex}\right)}{d^9}$$

command

```
integrate((a+b*ln(c*x**n))/x**3/(e*x+d)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.13 Problem number 144

$$\int \frac{x^3(a+b\log(cx^n))}{\sqrt{d+ex}}\,dx$$

Optimal antiderivative

$$-\frac{76b\,d^2n(ex+d)^{\frac{3}{2}}}{105e^4}+\frac{64bdn(ex+d)^{\frac{5}{2}}}{175e^4}-\frac{4bn(ex+d)^{\frac{7}{2}}}{49e^4}-\frac{64b\,d^{\frac{7}{2}}n\,\mathrm{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)}{35e^4}$$
$$+\frac{2d^2(ex+d)^{\frac{3}{2}}\left(a+b\ln\left(c\,x^n\right)\right)}{e^4}-\frac{6d(ex+d)^{\frac{5}{2}}\left(a+b\ln\left(c\,x^n\right)\right)}{5e^4}$$
$$+\frac{2(ex+d)^{\frac{7}{2}}\left(a+b\ln\left(c\,x^n\right)\right)}{7e^4}+\frac{64b\,d^3n\sqrt{ex+d}}{35e^4}-\frac{2d^3\left(a+b\ln\left(c\,x^n\right)\right)\sqrt{ex+d}}{e^4}$$

command

```
integrate(x**3*(a+b*ln(c*x**n))/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.14 Problem number 145

$$\int \frac{x^2(a+b\log(cx^n))}{\sqrt{d+ex}}\,dx$$

Optimal antiderivative

$$\frac{28bdn(ex+d)^{\frac{3}{2}}}{45e^3}-\frac{4bn(ex+d)^{\frac{5}{2}}}{25e^3}+\frac{32b\,d^{\frac{5}{2}}n\,\mathrm{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)}{15e^3}$$
$$-\frac{4d(ex+d)^{\frac{3}{2}}\left(a+b\ln\left(c\,x^n\right)\right)}{3e^3}+\frac{2(ex+d)^{\frac{5}{2}}\left(a+b\ln\left(c\,x^n\right)\right)}{5e^3}$$
$$-\frac{32b\,d^2n\sqrt{ex+d}}{15e^3}+\frac{2d^2\left(a+b\ln\left(c\,x^n\right)\right)\sqrt{ex+d}}{e^3}$$

command

```
integrate(x**2*(a+b*ln(c*x**n))/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2ad\left(\frac{d^2}{\sqrt{d+ex}}+2d\sqrt{d+ex}-\frac{(d+ex)^{\frac{3}{2}}}{3}\right)}{e^2} - \frac{2a\left(-\frac{d^3}{\sqrt{d+ex}}-3d^2\sqrt{d+ex}+d(d+ex)^{\frac{3}{2}}-\frac{(d+ex)^{\frac{5}{2}}}{5}\right)}{e^2} - \frac{2bd\left(d^2\left(\frac{\log\left(c\left(-\frac{d}{e}+\frac{d+ex}{e}\right)^n\right)}{\sqrt{d+ex}} - \frac{2n\,\cdots}{\cdots}\right.\right.}{\cdots} \\ \frac{\frac{ax^3}{3}+b\left(-\frac{nx^3}{9}+\frac{x^3\log(cx^n)}{3}\right)}{\sqrt{d}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.15 Problem number 146

$$\int \frac{x(a+b\log(cx^n))}{\sqrt{d+ex}}\,dx$$

Optimal antiderivative

$$-\frac{4bn(ex+d)^{\frac{3}{2}}}{9e^2}-\frac{8b\,d^{\frac{3}{2}}n\operatorname{arctanh}\left(\frac{\sqrt{ex+d}}{\sqrt{d}}\right)}{3e^2}+\frac{2(ex+d)^{\frac{3}{2}}\left(a+b\ln\left(c\,x^n\right)\right)}{3e^2}+\frac{8bdn\sqrt{ex+d}}{3e^2}-\frac{2d\left(a+b\ln\left(c\,x^n\right)\right)\sqrt{ex+d}}{e^2}$$

command

```
integrate(x*(a+b*ln(c*x**n))/(e*x+d)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{-\frac{2ad\left(-\frac{d}{\sqrt{d+ex}}-\sqrt{d+ex}\right)}{e}-\frac{2a\left(\frac{d^2}{\sqrt{d+ex}}+2d\sqrt{d+ex}-\frac{(d+ex)^{\frac{3}{2}}}{3}\right)}{e}-\frac{2bd\left(-d\left(\frac{\log\left(c\left(-\frac{d}{e}+\frac{d+ex}{e}\right)^n\right)}{\sqrt{d+ex}}-\frac{2n\,\mathrm{atan}\left(\frac{1}{\sqrt{-\frac{1}{d}}\,\sqrt{d+ex}}\right)}{d\sqrt{-\frac{1}{d}}}\right)\right)}{}}{} \\ \frac{\frac{ax^2}{2}+b\left(-\frac{nx^2}{4}+\frac{x^2\log\left(cx^n\right)}{2}\right)}{\sqrt{d}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.16 Problem number 225

$$\int \frac{a+b\log\left(cx^n\right)}{x^3\left(d+ex^2\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{bn}{2d^2x^2}+\frac{a+b\ln\left(c\,x^n\right)}{2d\,x^2\left(e\,x^2+d\right)}+\frac{-4a+bn-4b\ln\left(c\,x^n\right)}{4d^2x^2}+\frac{e\ln\left(1+\frac{d}{e\,x^2}\right)\left(4a-bn+4b\ln\left(c\,x^n\right)\right)}{4d^3}-\frac{ben\,\mathrm{polylog}\left(2,-\frac{d}{e\,x^2}\right)}{2d^3}$$

command

```
integrate((a+b*ln(c*x**n))/x**3/(e*x**2+d)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{ae^2\left(\begin{cases}\frac{x^2}{2d^2} & \text{for } e=0\\ -\frac{1}{2de+2e^2x^2} & \text{otherwise}\end{cases}\right)}{d^2}-\frac{a}{2d^2x^2}-\frac{2ae\log(x)}{d^3}$$
$$+\frac{ae\log(d+ex^2)}{d^3}-\frac{be^2n\left(\begin{cases}\frac{x^2}{2d^2} & \text{for } e=0\\ -\frac{\log(x)}{de}+\frac{\log\left(\frac{d}{e}+x^2\right)}{2de} & \text{otherwise}\end{cases}\right)}{2d^2}$$
$$+\frac{be^2\left(\begin{cases}\frac{x^2}{d^2} & \text{for } e=0\\ -\frac{1}{de+e^2x^2} & \text{otherwise}\end{cases}\right)\log(cx^n)}{2d^2}-\frac{bn}{4d^2x^2}-\frac{b\log(cx^n)}{2d^2x^2}$$
$$-\frac{be^2n\left(\begin{cases}\frac{x^2}{2d} & \text{for } e=\\ \frac{\begin{cases}-\frac{\mathrm{Li}_2\left(\frac{ex^2e^{i\pi}}{d}\right)}{2} & \text{for } \frac{1}{|x|}<1\wedge|x|<1\\ \log(d)\log(x)-\frac{\mathrm{Li}_2\left(\frac{ex^2e^{i\pi}}{d}\right)}{2} & \text{for } |x|<1\\ -\log(d)\log\left(\frac{1}{x}\right)-\frac{\mathrm{Li}_2\left(\frac{ex^2e^{i\pi}}{d}\right)}{2} & \text{for } \frac{1}{|x|}<1\\ -G_{2,2}^{2,0}\left(\begin{matrix} & 1,1\\ 0,0 & \end{matrix}\middle|x\right)\log(d)+G_{2,2}^{0,2}\left(\begin{matrix}1,1 & \\ & 0,0\end{matrix}\middle|x\right)\log(d)-\frac{\mathrm{Li}_2\left(\frac{ex^2e^{i\pi}}{d}\right)}{2} & \text{otherwise}\end{cases}}{e} & \text{otherw}\end{cases}\right)}{d^3}$$
$$+\frac{be^2\left(\begin{cases}\frac{x^2}{d} & \text{for } e=0\\ \frac{\log(d+ex^2)}{e} & \text{otherwise}\end{cases}\right)\log(cx^n)}{d^3}+\frac{ben\log(x^2)^2}{4d^3}-\frac{be\log(x^2)\log(cx^n)}{d^3}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.17 Problem number 232

$$\int\frac{x^3(a+b\log(cx^n))}{(d+ex^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{bn}{8e^2(e\,x^2+d)}+\frac{x^4(a+b\ln(c\,x^n))}{4d\,(e\,x^2+d)^2}-\frac{bn\ln(e\,x^2+d)}{8d\,e^2}$$

command

```
integrate(x**3*(a+b*ln(c*x**n))/(e*x**2+d)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{a}{2x^2} - \frac{bn}{4x^2} - \frac{b\log(cx^n)}{2x^2}\right) \\ \frac{\frac{ax^4}{4} - \frac{bnx^4}{16} + \frac{bx^4\log(cx^n)}{4}}{d^3} \\ \frac{-\frac{a}{2x^2} - \frac{bn}{4x^2} - \frac{b\log(cx^n)}{2x^2}}{e^3} \\ -\frac{2ad^2}{8d^3e^2+16d^2e^3x^2+8de^4x^4} - \frac{4adex^2}{8d^3e^2+16d^2e^3x^2+8de^4x^4} - \frac{bd^2n\log\left(x-\sqrt{-\frac{d}{e}}\right)}{8d^3e^2+16d^2e^3x^2+8de^4x^4} - \frac{bd^2n\log\left(x+\sqrt{-\frac{d}{e}}\right)}{8d^3e^2+16d^2e^3x^2+8de^4x^4} - \frac{bd^2n}{8d^3e^2+16d^2e^3x^2+8d} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.18 Problem number 233

$$\int \frac{x(a+b\log(cx^n))}{(d+ex^2)^3}\,dx$$

Optimal antiderivative

$$\frac{bn}{8de\,(e\,x^2+d)} + \frac{bn\ln(x)}{4d^2e} + \frac{-a-b\ln(c\,x^n)}{4e\,(e\,x^2+d)^2} - \frac{bn\ln\left(e\,x^2+d\right)}{8d^2e}$$

command

```
integrate(x*(a+b*ln(c*x**n))/(e*x**2+d)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\left(-\frac{a}{4x^4} - \frac{bn}{16x^4} - \frac{b\log(cx^n)}{4x^4}\right) \\ \frac{-\frac{a}{4x^4} - \frac{bn}{16x^4} - \frac{b\log(cx^n)}{4x^4}}{e^3} \\ \frac{\frac{ax^2}{2} - \frac{bnx^2}{4} + \frac{bx^2\log(cx^n)}{2}}{d^3} \\ -\frac{2ad^2}{8d^4e+16d^3e^2x^2+8d^2e^3x^4} - \frac{bd^2n\log\left(x-\sqrt{-\frac{d}{e}}\right)}{8d^4e+16d^3e^2x^2+8d^2e^3x^4} - \frac{bd^2n\log\left(x+\sqrt{-\frac{d}{e}}\right)}{8d^4e+16d^3e^2x^2+8d^2e^3x^4} + \frac{bd^2n}{8d^4e+16d^3e^2x^2+8d^2e^3x^4} - \frac{2bdenx^2\log\left(x-\sqrt{-\right.}\right.}{8d^4e+16d^3e^2x^2+8d} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.19 Problem number 234

$$\int \frac{a+b\log(cx^n)}{x\left(d+ex^2\right)^3}\,dx$$

Optimal antiderivative

$$\frac{a+b\ln(c\,x^n)}{4d\left(e\,x^2+d\right)^2}-\frac{\ln\left(1+\frac{d}{e\,x^2}\right)(4a-3bn+4b\ln(c\,x^n))}{8d^3}+\frac{4a-bn+4b\ln(c\,x^n)}{8d^2\left(e\,x^2+d\right)}+\frac{bn\,\mathrm{polylog}\left(2,-\frac{d}{e\,x^2}\right)}{4d^3}$$

command

```
integrate((a+b*ln(c*x**n))/x/(e*x**2+d)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{ae\left(\begin{cases}\frac{x^2}{2d^3} & \text{for } e=0\\ -\frac{1}{4e\left(d+ex^2\right)^2} & \text{otherwise}\end{cases}\right)}{d}-\frac{ae\left(\begin{cases}\frac{x^2}{2d^2} & \text{for } e=0\\ -\frac{1}{2de+2e^2x^2} & \text{otherwise}\end{cases}\right)}{d^2}+\frac{a\log(x)}{d^3}-\frac{a\log\left(d+ex^2\right)}{2d^3}$$
$$+\frac{be^2n\left(\begin{cases}-\frac{1}{2e^3x^2} & \text{for } d=0\\ -\frac{1}{4de^2+4e^3x^2}-\frac{\log\left(d+ex^2\right)}{4de^2} & \text{otherwise}\end{cases}\right)}{2d^2}-\frac{be^2\left(\begin{cases}\frac{1}{e^3x^2} & \text{for } d=0\\ -\frac{1}{2d\left(\frac{d}{x^2}+e\right)^2} & \text{otherwise}\end{cases}\right)\log(cx^n)}{2d^2}$$
$$-\frac{ben\left(\begin{cases}-\frac{1}{2e^2x^2} & \text{for } d=0\\ -\frac{\log\left(d+ex^2\right)}{2de} & \text{otherwise}\end{cases}\right)}{d^2}+\frac{be\left(\begin{cases}\frac{1}{e^2x^2} & \text{for } d=0\\ -\frac{1}{\frac{d^2}{x^2}+de} & \text{otherwise}\end{cases}\right)\log(cx^n)}{d^2}$$
$$+\frac{bn\left(\begin{cases}-\frac{1}{2ex^2} & \text{for } d=0\\ \frac{\begin{cases}\frac{\mathrm{Li}_2\left(\frac{de^{i\pi}}{ex^2}\right)}{2} & \text{for } \frac{1}{|x|}<1\wedge|x|<1\\ \log(e)\log(x)+\frac{\mathrm{Li}_2\left(\frac{de^{i\pi}}{ex^2}\right)}{2} & \text{for } |x|<1\\ -\log(e)\log\left(\frac{1}{x}\right)+\frac{\mathrm{Li}_2\left(\frac{de^{i\pi}}{ex^2}\right)}{2} & \text{for } \frac{1}{|x|}<1\\ -G_{2,2}^{2,0}\left(\begin{matrix} & 1,1\\ 0,0 & \end{matrix}\middle|x\right)\log(e)+G_{2,2}^{0,2}\left(\begin{matrix}1,1 & \\ & 0,0\end{matrix}\middle|x\right)\log(e)+\frac{\mathrm{Li}_2\left(\frac{de^{i\pi}}{ex^2}\right)}{2} & \text{otherwise}\end{cases}}{d} & \text{otherwise}\end{cases}\right)}{2d^2}$$
$$-\frac{b\left(\begin{cases}\frac{1}{ex^2} & \text{for } d=0\\ \frac{\log\left(\frac{d}{x^2}+e\right)}{d} & \text{otherwise}\end{cases}\right)\log(cx^n)}{2d^2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.20 Problem number 318

$$\int (fx)^m \left(d+ex^2\right)^3 (a+b\log(cx^n))\,dx$$

Optimal antiderivative

$$-\frac{b\,d^3n(fx)^{1+m}}{f\,(1+m)^2}-\frac{3b\,d^2en(fx)^{3+m}}{f^3\,(3+m)^2}-\frac{3bd\,e^2n(fx)^{5+m}}{f^5\,(5+m)^2}-\frac{b\,e^3n(fx)^{7+m}}{f^7\,(7+m)^2}+\frac{d^3(fx)^{1+m}\,(a+b\ln(c\,x^n))}{f\,(1+m)}+\frac{3d^2e(fx)^{3+m}\,(a+b\ln(c\,x^n))}{f^3\,(3+m)}+\frac{3d\,e^2(fx)^{5+m}\,(a+b\ln(c\,x^n))}{f^5\,(5+m)}+\frac{e^3(fx)^{7+m}\,(a+b\ln(c\,x^n))}{f^7\,(7+m)}$$

command

```
integrate((f*x)**m*(e*x**2+d)**3*(a+b*ln(c*x**n)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.21 Problem number 352

$$\int (fx)^{-1+m} (d+ex^m)^2 (a+b\log(cx^n))\,dx$$

Optimal antiderivative

$$-\frac{b\,d^2nx(fx)^{-1+m}}{m^2}-\frac{bden\,x^{1+m}(fx)^{-1+m}}{2m^2}-\frac{b\,e^2n\,x^{1+2m}(fx)^{-1+m}}{9m^2}-\frac{b\,d^3n\,x^{1-m}(fx)^{-1+m}\ln(x)}{3em}+\frac{x^{1-m}(fx)^{-1+m}\,(d+e\,x^m)^3\,(a+b\ln(c\,x^n))}{3em}$$

command

```
integrate((f*x)**(-1+m)*(d+e*x**m)**2*(a+b*ln(c*x**n)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.22 Problem number 353

$$\int (fx)^{-1+m} (d + ex^m) (a + b \log (cx^n)) \, dx$$

Optimal antiderivative

$$-\frac{bdn(fx)^m}{f\,m^2} - \frac{ben\,x^m(fx)^m}{4f\,m^2} + \frac{d(fx)^m\,(a + b\ln(c\,x^n))}{fm} + \frac{e\,x^m(fx)^m\,(a + b\ln(c\,x^n))}{2fm}$$

command

```
integrate((f*x)**(-1+m)*(d+e*x**m)*(a+b*ln(c*x**n)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}(d+e)\,(ax - bnx + bx\log(cx^n)) \\ \frac{(d+e)\left(\begin{cases} a\log(x) & \text{for } b = 0 \\ -(-a - b\log(c))\log(x) & \text{for } n = 0 \\ \frac{(-a-b\log(cx^n))^2}{2bn} & \text{otherwise} \end{cases}\right)}{f} \\ 0^{m-1}\left(\frac{adm^2x}{m^2+2m+1} + \frac{2admx}{m^2+2m+1} + \frac{adx}{m^2+2m+1} + \frac{aemxx^m}{m^2+2m+1} + \frac{aexx^m}{m^2+2m+1} - \frac{bdm^2nx}{m^2+2m+1} + \frac{bdm^2x\log(cx^n)}{m^2+2m+1} - \frac{2bdmnx}{m^2+2m+1} + \frac{2bdm}{m^2} \right. \\ \frac{ad(fx)^m}{fm} + \frac{aex^m(fx)^m}{2fm} + \frac{bd(fx)^m\log(cx^n)}{fm} - \frac{bdn(fx)^m}{fm^2} + \frac{bex^m(fx)^m\log(cx^n)}{2fm} - \frac{benx^m(fx)^m}{4fm^2} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.23 Problem number 361

$$\int (fx)^{-1+m} (d + ex^m) (a + b \log (cx^n))^2 \, dx$$

Optimal antiderivative

$$\frac{2b^2d\,n^2x(fx)^{-1+m}}{m^3} + \frac{b^2e\,n^2x^{1+m}(fx)^{-1+m}}{4m^3} + \frac{b^2d^2n^2x^{1-m}(fx)^{-1+m}\ln(x)^2}{2em} - \frac{2bdnx(fx)^{-1+m}\,(a + b\ln(c\,x^n))}{m^2} - \frac{ben\,x^{1+m}(fx)^{-1+m}\,(a + b\ln(c\,x^n))}{2m^2} - \frac{b\,d^2n\,x^{1-m}(fx)^{-1+m}\ln(x)\,(a + b\ln(c\,x^n))}{em} + \frac{x^{1-m}(fx)^{-1+m}\,(d + e\,x^m)^2\,(a + b\ln(c\,x^n))^2}{2em}$$

command

```
integrate((f*x)**(-1+m)*(d+e*x**m)*(a+b*ln(c*x**n))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.24 Problem number 379

$$\int x^5(d+ex^r)^2\left(a+b\log\left(cx^n\right)\right)\,dx$$

Optimal antiderivative

$$-\frac{b\,d^2n\,x^6}{36}-\frac{b\,e^2n\,x^{6+2r}}{4\,(3+r)^2}-\frac{2bden\,x^{6+r}}{(6+r)^2}+\frac{\left(d^2x^6+\frac{3e^2x^{6+2r}}{3+r}+\frac{12de\,x^{6+r}}{6+r}\right)\left(a+b\ln\left(c\,x^n\right)\right)}{6}$$

command

```
integrate(x**5*(d+e*x**r)**2*(a+b*ln(c*x**n)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.25 Problem number 408

$$\int\frac{a+b\log\left(cx^n\right)}{x\left(d+ex^r\right)}\,dx$$

Optimal antiderivative

$$-\frac{\left(a+b\ln\left(c\,x^n\right)\right)\ln\left(1+\frac{d\,x^{-r}}{e}\right)}{dr}+\frac{bn\,\mathrm{polylog}\left(2,-\frac{d\,x^{-r}}{e}\right)}{d\,r^2}$$

command

```
integrate((a+b*ln(c*x**n))/x/(d+e*x**r),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.26 Problem number 415

$$\int \frac{a+b\log\left(cx^n\right)}{x\left(d+ex^r\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{e\,x^r(a+b\ln\left(c\,x^n\right))}{d^2r\left(d+e\,x^r\right)}-\frac{(a+b\ln\left(c\,x^n\right))\ln\left(1+\frac{d\,x^{-r}}{e}\right)}{d^2r}+\frac{bn\ln\left(d+e\,x^r\right)}{d^2r^2}+\frac{bn\,\mathrm{polylog}\left(2,-\frac{d\,x^{-r}}{e}\right)}{d^2r^2}$$

command

```
integrate((a+b*ln(c*x**n))/x/(d+e*x**r)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{ae\left(\begin{cases}\frac{x^r}{d^2} & \text{for } e=0\\ -\frac{1}{de+e^2x^r} & \text{otherwise}\end{cases}\right)}{dr}-\frac{ae\left(\begin{cases}\frac{x^r}{d} & \text{for } e=0\\ \frac{\log(d+ex^r)}{e} & \text{otherwise}\end{cases}\right)}{d^2r}+\frac{a\log(x^r)}{d^2r}$$

$$+\frac{ben\left(\begin{cases}\frac{\begin{cases}\frac{x^r}{r} & \text{for } r\neq 0\\ \log(x) & \text{otherwise}\end{cases}}{d^2} & \text{for } e=0\\ -\begin{cases}\frac{\log(x)}{e^2} & \text{for } d=0\wedge r=0\\ -\frac{x^{-r}}{e^2r} & \text{for } d=0\\ \frac{\log(x)}{de+e^2} & \text{for } r=0\\ \frac{\log(x)}{de}-\frac{\log\left(\frac{d}{e}+x^r\right)}{der} & \text{otherwise}\end{cases} & \text{otherwise}\end{cases}\right)}{dr}$$

$$-\frac{be\left(\begin{cases}\frac{x^r}{d^2} & \text{for } e=0\\ -\frac{1}{de+e^2x^r} & \text{otherwise}\end{cases}\right)\log(cx^n)}{dr}$$

$$+\frac{ben\left(\begin{cases}\frac{\begin{cases}\frac{x^r}{r} & \text{for } r\neq 0\\ \log(x) & \text{otherwise}\end{cases}}{d} & \text{for } e=0\\ \frac{\begin{cases}-\frac{\operatorname{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{for } \frac{1}{|x|}<1\wedge |x|<1\\ \log(d)\log(x)-\frac{\operatorname{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{for } |x|<1\\ -\log(d)\log\left(\frac{1}{x}\right)-\frac{\operatorname{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{for } \frac{1}{|x|}<1\\ -G_{2,2}^{2,0}\left(\begin{matrix} & 1,1\\ 0,0 & \end{matrix}\middle|\, x\right)\log(d)+G_{2,2}^{0,2}\left(\begin{matrix}1,1 & \\ & 0,0\end{matrix}\middle|\, x\right)\log(d)-\frac{\operatorname{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{otherwise}\end{cases}}{e} & \text{otherwise}\end{cases}\right)}{d^2r}$$

$$-\frac{be\left(\begin{cases}\frac{x^r}{d} & \text{for } e=0\\ \frac{\log(d+ex^r)}{e} & \text{otherwise}\end{cases}\right)\log(cx^n)}{d^2r}+\frac{bn\left(\begin{cases}0 & \text{for } r=0\\ -\frac{\log(x^r)^2}{2r} & \text{otherwise}\end{cases}\right)}{d^2r}+\frac{b\log(x^r)\log(cx^n)}{d^2r}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.27 Problem number 424

$$\int \frac{a+b\log\left(cx^n\right)}{x\left(d+ex^r\right)}\,dx$$

Optimal antiderivative

$$-\frac{\left(a+b\ln\left(c\,x^n\right)\right)\ln\left(1+\frac{d\,x^{-r}}{e}\right)}{dr}+\frac{bn\,\mathrm{polylog}\left(2,-\frac{d\,x^{-r}}{e}\right)}{d\,r^2}$$

command

```
integrate((a+b*ln(c*x**n))/x/(d+e*x**r),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

37.28 Problem number 425

$$\int \frac{a+b\log\left(cx^n\right)}{x\left(d+ex^r\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{e\,x^r\left(a+b\ln\left(c\,x^n\right)\right)}{d^2r\left(d+e\,x^r\right)}-\frac{\left(a+b\ln\left(c\,x^n\right)\right)\ln\left(1+\frac{d\,x^{-r}}{e}\right)}{d^2r}+\frac{bn\ln\left(d+e\,x^r\right)}{d^2r^2}+\frac{bn\,\mathrm{polylog}\left(2,-\frac{d\,x^{-r}}{e}\right)}{d^2r^2}$$

command

```
integrate((a+b*ln(c*x**n))/x/(d+e*x**r)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{ae\left(\begin{cases}\frac{x^r}{d^2} & \text{for } e=0\\ -\frac{1}{de+e^2x^r} & \text{otherwise}\end{cases}\right)}{dr}-\frac{ae\left(\begin{cases}\frac{x^r}{d} & \text{for } e=0\\ \frac{\log(d+ex^r)}{e} & \text{otherwise}\end{cases}\right)}{d^2r}+\frac{a\log(x^r)}{d^2r}$$

$$+\frac{ben\left(\begin{cases}\frac{\begin{cases}\frac{x^r}{r} & \text{for } r\neq 0\\ \log(x) & \text{otherwise}\end{cases}}{d^2} & \text{for } e=0\\ -\begin{cases}\frac{\log(x)}{e^2} & \text{for } d=0\wedge r=0\\ -\frac{x^{-r}}{e^2r} & \text{for } d=0\\ \frac{\log(x)}{de+e^2} & \text{for } r=0\\ \frac{\log(x)}{de}-\frac{\log\left(\frac{d}{e}+x^r\right)}{der} & \text{otherwise}\end{cases} & \text{otherwise}\end{cases}\right)}{dr}$$

$$-\frac{be\left(\begin{cases}\frac{x^r}{d^2} & \text{for } e=0\\ -\frac{1}{de+e^2x^r} & \text{otherwise}\end{cases}\right)\log(cx^n)}{dr}$$

$$+\frac{ben\left(\begin{cases}\frac{\begin{cases}\frac{x^r}{r} & \text{for } r\neq 0\\ \log(x) & \text{otherwise}\end{cases}}{d} & \text{for } e=0\\ \frac{\begin{cases}-\frac{\mathrm{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{for } \frac{1}{|x|}<1\wedge|x|<1\\ \log(d)\log(x)-\frac{\mathrm{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{for } |x|<1\\ -\log(d)\log\left(\frac{1}{x}\right)-\frac{\mathrm{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{for } \frac{1}{|x|}<1\\ -G_{2,2}^{2,0}\left(\begin{matrix} & 1,1\\ 0,0 & \end{matrix}\middle|x\right)\log(d)+G_{2,2}^{0,2}\left(\begin{matrix}1,1 & \\ & 0,0\end{matrix}\middle|x\right)\log(d)-\frac{\mathrm{Li}_2\left(\frac{ex^re^{i\pi}}{d}\right)}{r} & \text{otherwise}\end{cases}}{e} & \text{otherwis}\end{cases}\right.}{d^2r}$$

$$-\frac{be\left(\begin{cases}\frac{x^r}{d} & \text{for } e=0\\ \frac{\log(d+ex^r)}{e} & \text{otherwise}\end{cases}\right)\log(cx^n)}{d^2r}+\frac{bn\left(\begin{cases}0 & \text{for } r=0\\ -\frac{\log(x^r)^2}{2r} & \text{otherwise}\end{cases}\right)}{d^2r}+\frac{b\log(x^r)\log(cx^n)}{d^2r}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

37.29 Problem number 441

$$\int (fx)^m (d+ex^r)^2 (a+b\log(cx^n))\,dx$$

Optimal antiderivative

$$-\frac{2bden\,x^{1+r}(fx)^m}{(1+m+r)^2}-\frac{b\,e^2n\,x^{1+2r}(fx)^m}{(1+2r+m)^2}-\frac{b\,d^2n(fx)^{1+m}}{f\,(1+m)^2}+\frac{2de\,x^{1+r}(fx)^m\,(a+b\ln(c\,x^n))}{1+m+r}+\frac{e^2x^{1+2r}(fx)^m\,(a+b\ln(c\,x^n))}{1+m+2r}+\frac{d^2(fx)^{1+m}\,(a+b\ln(c\,x^n))}{f\,(1+m)}$$

command

```
integrate((f*x)**m*(d+e*x**r)**2*(a+b*ln(c*x**n)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

38 Test file number 58

Test folder name:

```
test_cases/3_Logarithms/58_3.1.5_u-a+b_log-c_x^n-^p
```

38.1 Problem number 5

$$\int (a+b\log(cx^n))\log(1+ex)\,dx$$

Optimal antiderivative

$$2bnx-x(a+b\ln(c\,x^n))-\frac{bn(ex+1)\ln(ex+1)}{e}+\frac{(ex+1)\,(a+b\ln(c\,x^n))\ln(ex+1)}{e}+\frac{bn\,\mathrm{polylog}(2,-ex)}{e}$$

command

```
integrate((a+b*ln(c*x**n))*ln(e*x+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$a\left(\begin{cases} 0 & \text{for } e = 0 \\ x\log(ex+1) - x + \frac{\log(ex+1)}{e} - \frac{1}{e} & \text{otherwise} \end{cases}\right)$$
$$- be^2n\left(\begin{cases} \frac{x}{e^2} - \frac{\log(ex+1)}{e^3} & \text{for } e = 0 \\ \frac{\log(ex+1)^2}{2e^3} & \text{otherwise} \end{cases}\right) - bnx\log(ex+1) + 2bnx$$
$$- bn\left(\begin{cases} 0 & \text{for } e = 0 \\ \frac{\log(ex+1)^2}{2e} & \text{otherwise} \end{cases}\right) + bn\left(\begin{cases} x & \text{for } e = 0 \\ \frac{\log(ex+1)}{e} & \text{otherwise} \end{cases}\right)\log(ex+1)$$
$$- bn\left(\begin{cases} x & \text{for } e = 0 \\ \frac{\log(ex+1)}{e} & \text{otherwise} \end{cases}\right) - bn\left(\begin{cases} x & \text{for } e = 0 \\ -\frac{\mathrm{Li}_2(exe^{i\pi})}{e} & \text{otherwise} \end{cases}\right)$$
$$+ bx\log(cx^n)\log(ex+1) - bx\log(cx^n) + b\left(\begin{cases} x & \text{for } e = 0 \\ \frac{\log(ex+1)}{e} & \text{otherwise} \end{cases}\right)\log(cx^n)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

38.2 Problem number 208

$$\int x^2(a + b\log(cx^n))\,\mathrm{Li}_2(ex)\,dx$$

Optimal antiderivative

$$\frac{5bnx}{27e^2} + \frac{7bn\,x^2}{108e} + \frac{bn\,x^3}{27} - \frac{x(a + b\ln(c\,x^n))}{9e^2} - \frac{x^2(a + b\ln(c\,x^n))}{18e}$$
$$- \frac{x^3(a + b\ln(c\,x^n))}{27} + \frac{2bn\ln(-ex+1)}{27e^3} - \frac{2bn\,x^3\ln(-ex+1)}{27}$$
$$- \frac{(a + b\ln(c\,x^n))\ln(-ex+1)}{9e^3} + \frac{x^3(a + b\ln(c\,x^n))\ln(-ex+1)}{9}$$
$$- \frac{bn\operatorname{polylog}(2, ex)}{9e^3} - \frac{bn\,x^3\operatorname{polylog}(2, ex)}{9} + \frac{x^3(a + b\ln(c\,x^n))\operatorname{polylog}(2, ex)}{3}$$

command

```
integrate(x**2*(a+b*ln(c*x**n))*polylog(2,e*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{ax^3\,\mathrm{Li}_1(ex)}{9} + \frac{ax^3\,\mathrm{Li}_2(ex)}{3} - \frac{ax^3}{27} - \frac{ax^2}{18e} - \frac{ax}{9e^2} + \frac{a\,\mathrm{Li}_1(ex)}{9e^3} + \frac{2bnx^3\,\mathrm{Li}_1(ex)}{27} - \frac{bnx^3\,\mathrm{Li}_2(ex)}{9} + \frac{bnx^3}{27} - \frac{bx^3\log(cx^n)\,\mathrm{Li}_1(ex)}{9} + bx^3 \\ 0 \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

39 Test file number 61

Test folder name:

`test_cases/3_Logarithms/61_3.2.3_u_log-e-f-a+b_x-^p-c+d_x-^q-^r-^s`

39.1 Problem number 9

$$\int (a+bx)^2 \log \left(e(f(a+bx)^p(c+dx)^q)^r\right) \, dx$$

Optimal antiderivative

$$-\frac{(-ad+bc)^2\, qrx}{3d^2}+\frac{(-ad+bc)\, qr(bx+a)^2}{6bd}-\frac{pr(bx+a)^3}{9b}-\frac{qr(bx+a)^3}{9b}+\frac{(-ad+bc)^3\, qr\ln (dx+c)}{3b\, d^3}+\frac{(bx+a)^3\ln \left(e(f(bx+a)^p\,(dx+c)^q)^r\right)}{3b}$$

command

`integrate((b*x+a)**2*ln(e*(f*(b*x+a)**p*(d*x+c)**q)**r),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^2x\log \left(e(a^pc^qf)^r\right) \\ \frac{a^3\log\left(e(c^qf(a+bx)^p)^r\right)}{3b}-\frac{a^2prx}{3}+a^2x\log \left(e(c^qf(a+bx)^p)^r\right)-\frac{abprx^2}{3}+abx^2\log \left(e(c^qf(a+bx)^p)^r\right)-\frac{b^2prx^3}{9}+\frac{b^2x^3\log \ldots \\ a^2\left(\frac{c\log\left(e(a^pf(c+dx)^q)^r\right)}{d}-qrx+x\log \left(e(a^pf(c+dx)^q)^r\right)\right) \\ -\frac{a^3qr\log\left(\frac{c}{d}+x\right)}{3b}+\frac{a^3\log\left(e(f(a+bx)^p(c+dx)^q)^r\right)}{3b}+\frac{a^2cqr\log\left(\frac{c}{d}+x\right)}{d}-\frac{a^2prx}{3}-a^2qrx+a^2x\log \left(e(f(a+bx)^p\,(c+dx)^q)^r\right)- \ldots \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

39.2 Problem number 48

$$\int \frac{1}{(1-c^2x^2)\left(a+b\log \left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2} \, dx$$

Optimal antiderivative

$$\frac{1}{bc\left(a+b\ln \left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)\right)}$$

command

```
integrate(1/(-c**2*x**2+1)/(a+b*ln((-c*x+1)**(1/2)/(c*x+1)**(1/2)))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{x}{a^2} & \text{for}\: b = 0 \wedge c = 0 \\ \frac{- \frac{\log{\left(x - \frac{1}{c} \right)}}{2c} + \frac{\log{\left(x + \frac{1}{c} \right)}}{2c}}{a^2} & \text{for}\: b = 0 \\ \frac{x}{a^2} & \text{for}\: c = 0 \\ \frac{1}{abc + b^2 c \log{\left(\frac{\sqrt{-cx + 1}}{\sqrt{cx + 1}} \right)}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

40 Test file number 62

Test folder name:

```
test_cases/3_Logarithms/62_3.3_u-a+b_log-c-d+e_x-^n-^p
```

40.1 Problem number 143

$$\int \frac{a + b\log\left(c(d + ex)^n\right)}{(f + gx)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{4ben}{15g\left(-dg + ef\right)\left(gx + f\right)^{\frac{3}{2}}} - \frac{4b\,e^{\frac{5}{2}}n\,\mathrm{arctanh}\left(\frac{\sqrt{e}\,\sqrt{gx + f}}{\sqrt{-dg + ef}}\right)}{5g\left(-dg + ef\right)^{\frac{5}{2}}} - \frac{2(a + b\ln\left(c(ex + d)^n\right))}{5g\left(gx + f\right)^{\frac{5}{2}}} + \frac{4b\,e^2n}{5g\left(-dg + ef\right)^2\sqrt{gx + f}}$$

command

```
integrate((a+b*ln(c*(e*x+d)**n))/(g*x+f)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{-\frac{2a}{5(f+gx)^{\frac{5}{2}}}+2b\left(\frac{2en\left(\frac{eg}{\sqrt{f+gx}\,(dg-ef)^2}+\frac{eg\operatorname{atan}\left(\frac{\sqrt{f+gx}}{\sqrt{\frac{dg-ef}{e}}}\right)}{\sqrt{\frac{dg-ef}{e}}\,(dg-ef)^2}-\frac{g}{3(f+gx)^{\frac{3}{2}}(dg-ef)}\right)}{5g}-\frac{\log\left(c\left(d-\frac{ef}{g}+\frac{e(f+gx)}{g}\right)^n\right)}{5(f+gx)^{\frac{5}{2}}}\right)}{g}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41 Test file number 63

Test folder name:

`test_cases/3_Logarithms/63_3.4_u-a+b_log-c-d+e_x^m-^n-^p`

41.1 Problem number 11

$$\int\frac{\log\left(c\left(a+bx^2\right)^p\right)}{x^6}\,dx$$

Optimal antiderivative

$$-\frac{2bp}{15x^3a}+\frac{2b^2p}{5a^2x}+\frac{2b^{\frac{5}{2}}p\arctan\left(\frac{x\sqrt{b}}{\sqrt{a}}\right)}{5a^{\frac{5}{2}}}-\frac{\ln\left(c\left(b\,x^2+a\right)^p\right)}{5x^5}$$

command

`integrate(ln(c*(b*x**2+a)**p)/x**6,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{\log(0^p c)}{5x^5} \\ -\frac{\log(a^p c)}{5x^5} \\ -\frac{2p}{25x^5} - \frac{\log\left(c(bx^2)^p\right)}{5x^5} \\ -\frac{3a^3\sqrt{-\frac{a}{b}}\log\left(c(a+bx^2)^p\right)}{15a^3x^5\sqrt{-\frac{a}{b}}+15a^2bx^7\sqrt{-\frac{a}{b}}} - \frac{2a^2px^2\sqrt{-\frac{a}{b}}}{\frac{15a^3x^5\sqrt{-\frac{a}{b}}}{b}+15a^2x^7\sqrt{-\frac{a}{b}}} - \frac{3a^2x^2\sqrt{-\frac{a}{b}}\log\left(c(a+bx^2)^p\right)}{\frac{15a^3x^5\sqrt{-\frac{a}{b}}}{b}+15a^2x^7\sqrt{-\frac{a}{b}}} + \frac{6abpx^5\log\left(x-\sqrt{-\frac{a}{b}}\right)}{\frac{15a^3x^5\sqrt{-\frac{a}{b}}}{b}+15a^2x^7\sqrt{-}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.2 Problem number 20

$$\int \frac{\log\left(c(a+bx^3)^p\right)}{x^2}\,dx$$

Optimal antiderivative

$$-\frac{b^{\frac{1}{3}}p\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{a^{\frac{1}{3}}}+\frac{b^{\frac{1}{3}}p\ln\left(a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2\right)}{2a^{\frac{1}{3}}} - \frac{\ln\left(c(b\,x^3+a)^p\right)}{x} - \frac{b^{\frac{1}{3}}p\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{a^{\frac{1}{3}}}$$

command

```
integrate(ln(c*(b*x**3+a)**p)/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{\log(0^p c)}{x} \\ -\frac{3p}{x} - \frac{\log\left(c(bx^3)^p\right)}{x} \\ -\frac{\log(a^p c)}{x} \\ -\frac{\log\left(c(a+bx^3)^p\right)}{x} + \frac{3bp\left(-\frac{a}{b}\right)^{\frac{2}{3}}\log\left(4x^2+4x\sqrt[3]{-\frac{a}{b}}+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{2a} - \frac{\sqrt{3}\,bp\left(-\frac{a}{b}\right)^{\frac{2}{3}}\operatorname{atan}\left(\frac{2\sqrt{3}\,x}{3\sqrt[3]{-\frac{a}{b}}}+\frac{\sqrt{3}}{3}\right)}{a} - \frac{b\left(-\frac{a}{b}\right)^{\frac{2}{3}}\log\left(c(a+bx^3)^p\right)}{a} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.3 Problem number 52

$$\int \frac{\log \left(c\left(a+b\sqrt{x}\right)^p\right)}{x^3}\,dx$$

Optimal antiderivative

$$-\frac{bp}{6a\,x^{\frac{3}{2}}}+\frac{b^2p}{4a^2x}-\frac{b^4p\ln(x)}{4a^4}+\frac{b^4p\ln\left(a+b\sqrt{x}\right)}{2a^4}-\frac{\ln\left(c\left(a+b\sqrt{x}\right)^p\right)}{2x^2}-\frac{b^3p}{2a^3\sqrt{x}}$$

command

```
integrate(ln(c*(a+b*x**(1/2))**p)/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{6a^5\sqrt{x}\,\log\left(c\left(a+b\sqrt{x}\right)^p\right)}{12a^5x^{\frac{5}{2}}+12a^4bx^3}-\frac{2a^4bpx}{12a^5x^{\frac{5}{2}}+12a^4bx^3}-\frac{6a^4bx\log\left(c\left(a+b\sqrt{x}\right)^p\right)}{12a^5x^{\frac{5}{2}}+12a^4bx^3}+\frac{a^3b^2px^{\frac{3}{2}}}{12a^5x^{\frac{5}{2}}+12a^4bx^3}-\frac{3a^2b^3px^2}{12a^5x^{\frac{5}{2}}+12a^4bx^3}-\frac{3ab^4px^{\frac{5}{2}}}{12a^5x^{\frac{5}{2}}+ \\ -\frac{p}{8x^2}-\frac{\log\left(c\left(b\sqrt{x}\right)^p\right)}{2x^2} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.4 Problem number 60

$$\int (fx)^m \log\left(c\left(d+\frac{e}{x^3}\right)^p\right)\,dx$$

Optimal antiderivative

$$-\frac{3e\,f^2p(fx)^{-2+m}\,\mathrm{hypergeom}\left(\left[1,\frac{2}{3}-\frac{m}{3}\right],\left[\frac{5}{3}-\frac{m}{3}\right],-\frac{e}{d\,x^3}\right)}{d\left(-m^2+m+2\right)}+\frac{(fx)^{1+m}\ln\left(c\left(d+\frac{e}{x^3}\right)^p\right)}{f\,(1+m)}$$

command

```
integrate((f*x)**m*ln(c*(d+e/x**3)**p),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
3ep\left(\begin{cases} 0^m\operatorname{RootSum}\left(27t^3de^2-1,\left(t\mapsto t\log\left(3te+x\right)\right)\right) & \\ 0^m\operatorname{RootSum}\left(27t^3de^2-1,\left(t\mapsto t\log\left(3te+x\right)\right)\right) & \\ \frac{ff^mmx^m\Phi\left(\frac{ee^{i\pi}}{dx^3},1,\frac{2}{3}-\frac{m}{3}\right)\Gamma\left(\frac{2}{3}-\frac{m}{3}\right)}{9dfmx^2\Gamma\left(\frac{5}{3}-\frac{m}{3}\right)+9dfx^2\Gamma\left(\frac{5}{3}-\frac{m}{3}\right)}-\frac{2ff^mx^m\Phi\left(\frac{ee^{i\pi}}{dx^3},1,\frac{2}{3}-\frac{m}{3}\right)\Gamma\left(\frac{2}{3}-\frac{m}{3}\right)}{9dfmx^2\Gamma\left(\frac{5}{3}-\frac{m}{3}\right)+9dfx^2\Gamma\left(\frac{5}{3}-\frac{m}{3}\right)} & \\ \frac{\begin{cases}-\frac{1}{9dx^3} & \text{for}\: e=0\\ \frac{\begin{cases}\frac{\operatorname{Li}_2\left(\frac{ee^{i\pi}}{dx^3}\right)}{3} & \text{for}\: \frac{1}{|x|}<1\wedge |x|<1\\ \log\left(d\right)\log\left(x\right)+\frac{\operatorname{Li}_2\left(\frac{ee^{i\pi}}{dx^3}\right)}{3} & \text{for}\: |x|<1\\ -\log\left(d\right)\log\left(\frac{1}{x}\right)+\frac{\operatorname{Li}_2\left(\frac{ee^{i\pi}}{dx^3}\right)}{3} & \text{for}\: \frac{1}{|x|}<1\\ -G_{2,2}^{2,0}\left(\left.\begin{matrix} & 1,1\\ 0,0 & \end{matrix}\right| x\right)\log\left(d\right)+G_{2,2}^{0,2}\left(\left.\begin{matrix}1,1 & \\ & 0,0\end{matrix}\right| x\right)\log\left(d\right)+\frac{\operatorname{Li}_2\left(\frac{ee^{i\pi}}{dx^3}\right)}{3} & \text{otherwise}\end{cases}}{3e} & \text{otherwise}\end{cases}}{f} & \end{cases}\right)
$$

$$
+\left(\begin{cases}0^mx & \text{for}\: f=0\\ \frac{\begin{cases}\frac{(fx)^{m+1}}{m+1} & \text{for}\: m\neq -1\\ \log\left(fx\right) & \text{otherwise}\end{cases}}{f} & \text{otherwise}\end{cases}\right)\log\left(c\left(d+\frac{e}{x^3}\right)^p\right)
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.5 Problem number 192

$$
\int (d+ex)^2\log\left(c\left(a+bx^3\right)^p\right)\,dx
$$

Optimal antiderivative

$$
\begin{aligned}
&-3d^2px-\frac{3dep\,x^2}{2}-\frac{e^2p\,x^3}{3}+\frac{a^{\frac{1}{3}}d\left(b^{\frac{1}{3}}d-a^{\frac{1}{3}}e\right)p\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}x\right)}{b^{\frac{2}{3}}}\\
&-\frac{a^{\frac{1}{3}}d\left(b^{\frac{1}{3}}d-a^{\frac{1}{3}}e\right)p\ln\left(a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}x+b^{\frac{2}{3}}x^2\right)}{2b^{\frac{2}{3}}}-\frac{\left(-a\,e^3+b\,d^3\right)p\ln\left(b\,x^3+a\right)}{3be}\\
&+\frac{\left(ex+d\right)^3\ln\left(c\left(b\,x^3+a\right)^p\right)}{3e}-\frac{a^{\frac{1}{3}}d\left(b^{\frac{1}{3}}d+a^{\frac{1}{3}}e\right)p\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}x\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{b^{\frac{2}{3}}}
\end{aligned}
$$

command

```
integrate((e*x+d)**2*ln(c*(b*x**3+a)**p),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
\begin{aligned}
&3ad^2p\,\mathrm{RootSum}\left(27t^3a^2b-1,\left(t\mapsto t\log\left(3ta+x\right)\right)\right)\\
&+3adep\,\mathrm{RootSum}\left(27t^3ab^2+1,\left(t\mapsto t\log\left(9t^2ab+x\right)\right)\right)\\
&+\frac{ae^2p\left(\begin{cases}\frac{x^3}{a} & \text{for } b=0\\ \frac{\log\left(a+bx^3\right)}{b} & \text{otherwise}\end{cases}\right)}{3}-3d^2px+d^2x\log\left(c\left(a+bx^3\right)^p\right)\\
&-\frac{3depx^2}{2}+dex^2\log\left(c\left(a+bx^3\right)^p\right)-\frac{e^2px^3}{3}+\frac{e^2x^3\log\left(c\left(a+bx^3\right)^p\right)}{3}
\end{aligned}
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.6 Problem number 268

$$\int\left(f+gx^2\right)^3\log\left(c\left(d+ex^2\right)^p\right)\,dx$$

Optimal antiderivative

$$
\begin{aligned}
&-2f^3px+\frac{2d\,f^2gpx}{e}-\frac{6d^2f\,g^2px}{5e^2}+\frac{2d^3g^3px}{7e^3}-\frac{2f^2gp\,x^3}{3}+\frac{2df\,g^2p\,x^3}{5e}-\frac{2d^2g^3p\,x^3}{21e^2}\\
&-\frac{6f\,g^2p\,x^5}{25}+\frac{2d\,g^3p\,x^5}{35e}-\frac{2g^3p\,x^7}{49}-\frac{2d^{\frac{3}{2}}f^2gp\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{e^{\frac{3}{2}}}+\frac{6d^{\frac{5}{2}}f\,g^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{5e^{\frac{5}{2}}}\\
&-\frac{2d^{\frac{7}{2}}g^3p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{7e^{\frac{7}{2}}}+f^3x\ln\left(c\left(e\,x^2+d\right)^p\right)+f^2g\,x^3\ln\left(c\left(e\,x^2+d\right)^p\right)\\
&+\frac{3f\,g^2x^5\ln\left(c\left(e\,x^2+d\right)^p\right)}{5}+\frac{g^3x^7\ln\left(c\left(e\,x^2+d\right)^p\right)}{7}+\frac{2f^3p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)\sqrt{d}}{\sqrt{e}}
\end{aligned}
$$

command

```
integrate((g*x**2+f)**3*ln(c*(e*x**2+d)**p),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$
\begin{cases}
\left(f^3x+f^2gx^3+\frac{3fg^2x^5}{5}+\frac{g^3x^7}{7}\right)\log\left(0^pc\right)\\
-2f^3px+f^3x\log\left(c\left(ex^2\right)^p\right)-\frac{2f^2gpx^3}{3}+f^2gx^3\log\left(c\left(ex^2\right)^p\right)-\frac{6fg^2px^5}{25}+\frac{3fg^2x^5\log\left(c\left(ex^2\right)^p\right)}{5}-\frac{2g^3px^7}{49}+\frac{g^3x^7\log\left(c\left(e\right.\right.}{7}\\
\left(f^3x+f^2gx^3+\frac{3fg^2x^5}{5}+\frac{g^3x^7}{7}\right)\log\left(cd^p\right)\\
-\frac{2d^4g^3p\log\left(x-\sqrt{-\frac{d}{e}}\right)}{7e^4\sqrt{-\frac{d}{e}}}+\frac{d^4g^3\log\left(c\left(d+ex^2\right)^p\right)}{7e^4\sqrt{-\frac{d}{e}}}+\frac{6d^3fg^2p\log\left(x-\sqrt{-\frac{d}{e}}\right)}{5e^3\sqrt{-\frac{d}{e}}}-\frac{3d^3fg^2\log\left(c\left(d+ex^2\right)^p\right)}{5e^3\sqrt{-\frac{d}{e}}}+\frac{2d^3g^3px}{7e^3}-\frac{2d^2f^2gp\log}{e^2\sqrt{}}
\end{cases}
$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.7 Problem number 289

$$\int \left(f+gx^3\right)^2 \log \left(c\left(d+ex^2\right)^p\right) \, dx$$

Optimal antiderivative

$$-2f^2px+\frac{2d^3g^2px}{7e^3}+\frac{dfgp\,x^2}{2e}-\frac{2d^2g^2p\,x^3}{21e^2}-\frac{fgp\,x^4}{4}+\frac{2d\,g^2p\,x^5}{35e}-\frac{2g^2p\,x^7}{49} -\frac{2d^{\frac{7}{2}}g^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{7e^{\frac{7}{2}}}-\frac{d^2fgp\ln\left(e\,x^2+d\right)}{2e^2}+f^2x\ln\left(c\left(e\,x^2+d\right)^p\right) +\frac{fg\,x^4\ln\left(c\left(e\,x^2+d\right)^p\right)}{2}+\frac{g^2x^7\ln\left(c\left(e\,x^2+d\right)^p\right)}{7}+\frac{2f^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)\sqrt{d}}{\sqrt{e}}$$

command

```
integrate((g*x**3+f)**2*ln(c*(e*x**2+d)**p),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \left(f^2x+\frac{fgx^4}{2}+\frac{g^2x^7}{7}\right)\log\left(0^pc\right) \\ -2f^2px+f^2x\log\left(c\left(ex^2\right)^p\right)-\frac{fgpx^4}{4}+\frac{fgx^4\log\left(c\left(ex^2\right)^p\right)}{2}-\frac{2g^2px^7}{49}+\frac{g^2x^7\log\left(c\left(ex^2\right)^p\right)}{7} \\ \left(f^2x+\frac{fgx^4}{2}+\frac{g^2x^7}{7}\right)\log\left(cd^p\right) \\ -\frac{2d^4g^2p\log\left(x-\sqrt{-\frac{d}{e}}\right)}{7e^4\sqrt{-\frac{d}{e}}}+\frac{d^4g^2\log\left(c\left(d+ex^2\right)^p\right)}{7e^4\sqrt{-\frac{d}{e}}}+\frac{2d^3g^2px}{7e^3}-\frac{d^2fg\log\left(c\left(d+ex^2\right)^p\right)}{2e^2}-\frac{2d^2g^2px^3}{21e^2}+\frac{2df^2p\log\left(x-\sqrt{-\frac{d}{e}}\right)}{e\sqrt{-\frac{d}{e}}}-\frac{df^2 \cdots}{} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.8 Problem number 315

$$\int \frac{(f+gx^2)\log\left(c(d+ex^2)^p\right)}{x^5}\,dx$$

Optimal antiderivative

$$-\frac{efp}{4d\,x^2}-\frac{e(-2dg+ef)\,p\ln(x)}{2d^2}+\frac{(-dg+ef)^2\,p\ln\left(e\,x^2+d\right)}{4d^2f}-\frac{\left(g\,x^2+f\right)^2\ln\left(c\left(e\,x^2+d\right)^p\right)}{4f\,x^4}$$

command

```
integrate((g*x**2+f)*ln(c*(e*x**2+d)**p)/x**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{f\log\left(c(d+ex^2)^p\right)}{4x^4}-\frac{g\log\left(c(d+ex^2)^p\right)}{2x^2}-\frac{efp}{4dx^2}+\frac{egp\log(x)}{d}-\frac{eg\log\left(c(d+ex^2)^p\right)}{2d}-\frac{e^2fp\log(x)}{2d^2}+\frac{e^2f\log\left(c(d+ex^2)^p\right)}{4d^2} & \text{for } d\neq \\ -\frac{fp}{8x^4}-\frac{f\log\left(c(ex^2)^p\right)}{4x^4}-\frac{gp}{2x^2}-\frac{g\log\left(c(ex^2)^p\right)}{2x^2} & \text{otherwi} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.9 Problem number 322

$$\int \frac{(f+gx^2)\log\left(c(d+ex^2)^p\right)}{x^6}\,dx$$

Optimal antiderivative

$$-\frac{2efp}{15d\,x^3}+\frac{2e^2fp}{5d^2x}-\frac{2egp}{3dx}+\frac{2e^{\frac{5}{2}}fp\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{5d^{\frac{5}{2}}}-\frac{2e^{\frac{3}{2}}gp\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{3d^{\frac{3}{2}}}-\frac{f\ln\left(c\left(e\,x^2+d\right)^p\right)}{5x^5}-\frac{g\ln\left(c\left(e\,x^2+d\right)^p\right)}{3x^3}$$

command

```
integrate((g*x**2+f)*ln(c*(e*x**2+d)**p)/x**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

41.10 Problem number 332

$$\int x^2 (f+gx^2)^2 \log\left(c(d+ex^2)^p\right)\,dx$$

Optimal antiderivative

$$\frac{2d\,f^2px}{3e}-\frac{4d^2fgpx}{5e^2}+\frac{2d^3g^2px}{7e^3}-\frac{2f^2p\,x^3}{9}+\frac{4dfgp\,x^3}{15e}-\frac{2d^2g^2p\,x^3}{21e^2}-\frac{4fgp\,x^5}{25}+\frac{2d\,g^2p\,x^5}{35e}-\frac{2g^2p\,x^7}{49}-\frac{2d^{\frac{3}{2}}f^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{3e^{\frac{3}{2}}}+\frac{4d^{\frac{5}{2}}fgp\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{5e^{\frac{5}{2}}}-\frac{2d^{\frac{7}{2}}g^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{7e^{\frac{7}{2}}}+\frac{f^2x^3\ln\left(c(e\,x^2+d)^p\right)}{3}+\frac{2fg\,x^5\ln\left(c(e\,x^2+d)^p\right)}{5}+\frac{g^2x^7\ln\left(c(e\,x^2+d)^p\right)}{7}$$

command

```
integrate(x**2*(g*x**2+f)**2*ln(c*(e*x**2+d)**p),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\left(\frac{f^2x^3}{3}+\frac{2fgx^5}{5}+\frac{g^2x^7}{7}\right)\log\left(0^pc\right) \\ \left(\frac{f^2x^3}{3}+\frac{2fgx^5}{5}+\frac{g^2x^7}{7}\right)\log\left(cd^p\right) \\ -\frac{2f^2px^3}{9}+\frac{f^2x^3\log\left(c(ex^2)^p\right)}{3}-\frac{4fgpx^5}{25}+\frac{2fgx^5\log\left(c(ex^2)^p\right)}{5}-\frac{2g^2px^7}{49}+\frac{g^2x^7\log\left(c(ex^2)^p\right)}{7} \\ -\frac{2d^4g^2p\log\left(x-\sqrt{-\frac{d}{e}}\right)}{7e^4\sqrt{-\frac{d}{e}}}+\frac{d^4g^2\log\left(c(d+ex^2)^p\right)}{7e^4\sqrt{-\frac{d}{e}}}+\frac{4d^3fgp\log\left(x-\sqrt{-\frac{d}{e}}\right)}{5e^3\sqrt{-\frac{d}{e}}}-\frac{2d^3fg\log\left(c(d+ex^2)^p\right)}{5e^3\sqrt{-\frac{d}{e}}}+\frac{2d^3g^2px}{7e^3}-\frac{2d^2f^2p\log\left(x-\ldots\right.}{3e^2\sqrt{-\ldots}}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.11 Problem number 335

$$\int \frac{(f+gx^2)^2\log\left(c(d+ex^2)^p\right)}{x^4}\,dx$$

Optimal antiderivative

$$-\frac{2e\,f^2p}{3dx}-2g^2px-\frac{2e^{\frac{3}{2}}f^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{3d^{\frac{3}{2}}}-\frac{f^2\ln\left(c(e\,x^2+d)^p\right)}{3x^3}-\frac{2fg\ln\left(c(e\,x^2+d)^p\right)}{x}+g^2x\ln\left(c(e\,x^2+d)^p\right)+\frac{2g^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)\sqrt{d}}{\sqrt{e}}+\frac{4fgp\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)\sqrt{e}}{\sqrt{d}}$$

command

`integrate((g*x**2+f)**2*ln(c*(e*x**2+d)**p)/x**4,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \left(-\frac{f^2}{3x^3} - \frac{2fg}{x} + g^2x\right)\log\left(0^pc\right) \\ -\frac{2f^2p}{9x^3} - \frac{f^2\log\left(c(ex^2)^p\right)}{3x^3} - \frac{4fgp}{x} - \frac{2fg\log\left(c(ex^2)^p\right)}{x} - 2g^2px + g^2x\log\left(c(ex^2)^p\right) \\ \left(-\frac{f^2}{3x^3} - \frac{2fg}{x} + g^2x\right)\log\left(cd^p\right) \\ \frac{2dg^2p\log\left(x-\sqrt{-\frac{d}{e}}\right)}{e\sqrt{-\frac{d}{e}}} - \frac{dg^2\log\left(c(d+ex^2)^p\right)}{e\sqrt{-\frac{d}{e}}} - \frac{f^2\log\left(c(d+ex^2)^p\right)}{3x^3} + \frac{4fgp\log\left(x-\sqrt{-\frac{d}{e}}\right)}{\sqrt{-\frac{d}{e}}} - \frac{2fg\log\left(c(d+ex^2)^p\right)}{\sqrt{-\frac{d}{e}}} - \frac{2fg\log\left(c(d+\right.}{x} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.12 Problem number 336

$$\int \frac{\left(f+gx^2\right)^2\log\left(c\left(d+ex^2\right)^p\right)}{x^6}\,dx$$

Optimal antiderivative

$$-\frac{2e\,f^2p}{15d\,x^3} + \frac{2e^2f^2p}{5d^2x} - \frac{4efgp}{3dx} + \frac{2e^{\frac{5}{2}}f^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{5d^{\frac{5}{2}}} - \frac{4e^{\frac{3}{2}}fgp\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{3d^{\frac{3}{2}}} - \frac{f^2\ln\left(c\left(e\,x^2+d\right)^p\right)}{5x^5} - \frac{2fg\ln\left(c\left(e\,x^2+d\right)^p\right)}{3x^3} - \frac{g^2\ln\left(c\left(e\,x^2+d\right)^p\right)}{x} + \frac{2g^2p\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)\sqrt{e}}{\sqrt{d}}$$

command

`integrate((g*x**2+f)**2*ln(c*(e*x**2+d)**p)/x**6,x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

41.13 Problem number 406

$$\int \frac{a+b\log\left(c\left(d+e\sqrt{x}\right)^n\right)}{x^3}\,dx$$

Optimal antiderivative

$$-\frac{ben}{6d\,x^{\frac{3}{2}}}+\frac{b\,e^2n}{4d^2x}-\frac{b\,e^4n\ln(x)}{4d^4}+\frac{b\,e^4n\ln\left(d+e\sqrt{x}\right)}{2d^4}+\frac{-a-b\ln\left(c\left(d+e\sqrt{x}\right)^n\right)}{2x^2}-\frac{b\,e^3n}{2d^3\sqrt{x}}$$

command

```
integrate((a+b*ln(c*(d+e*x**(1/2))**n))/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{6ad^5\sqrt{x}}{12d^5x^{\frac{5}{2}}+12d^4ex^3}-\frac{6ad^4ex}{12d^5x^{\frac{5}{2}}+12d^4ex^3}-\frac{6bd^5\sqrt{x}\log\left(c\left(d+e\sqrt{x}\right)^n\right)}{12d^5x^{\frac{5}{2}}+12d^4ex^3}-\frac{2bd^4enx}{12d^5x^{\frac{5}{2}}+12d^4ex^3}-\frac{6bd^4ex\log\left(c\left(d+e\sqrt{x}\right)^n\right)}{12d^5x^{\frac{5}{2}}+12d^4ex^3}+\frac{bd^3}{12d^5x^{\frac{5}{2}}} \\ -\frac{a}{2x^2}-\frac{bn}{8x^2}-\frac{b\log\left(c\left(e\sqrt{x}\right)^n\right)}{2x^2}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.14 Problem number 426

$$\int \frac{a+b\log\left(c\left(d+\frac{e}{\sqrt{x}}\right)^n\right)}{x^2}\,dx$$

Optimal antiderivative

$$\frac{bn}{2x}+\frac{b\,d^2n\ln\left(d+\frac{e}{\sqrt{x}}\right)}{e^2}+\frac{-a-b\ln\left(c\left(d+\frac{e}{\sqrt{x}}\right)^n\right)}{x}-\frac{bdn}{e\sqrt{x}}$$

command

```
integrate((a+b*ln(c*(d+e/x**(1/2))**n))/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{2ade^2x^3}{2de^2x^4+2e^3x^{\frac{7}{2}}}-\frac{2ae^3x^{\frac{5}{2}}}{2de^2x^4+2e^3x^{\frac{7}{2}}}+\frac{2bd^3x^4\log\left(c\left(d+\frac{e}{\sqrt{x}}\right)^n\right)}{2de^2x^4+2e^3x^{\frac{7}{2}}}-\frac{2bd^2enx^{\frac{7}{2}}}{2de^2x^4+2e^3x^{\frac{7}{2}}}+\frac{2bd^2ex^{\frac{7}{2}}\log\left(c\left(d+\frac{e}{\sqrt{x}}\right)^n\right)}{2de^2x^4+2e^3x^{\frac{7}{2}}}-\frac{bde^2nx^3}{2de^2x^4+2e^3x} \\ -\frac{a+b\log\left(cd^n\right)}{x}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.15 Problem number 447

$$\int \frac{a + b\log\left(c\left(d + e\sqrt[3]{x}\right)^n\right)}{x^2}\,dx$$

Optimal antiderivative

$$-\frac{ben}{2d\,x^{\frac{2}{3}}} + \frac{b\,e^2n}{d^2x^{\frac{1}{3}}} - \frac{b\,e^3n\ln\left(d + e\,x^{\frac{1}{3}}\right)}{d^3} + \frac{-a - b\ln\left(c\left(d + e\,x^{\frac{1}{3}}\right)^n\right)}{x} + \frac{b\,e^3n\ln(x)}{3d^3}$$

command

```
integrate((a+b*ln(c*(d+e*x**(1/3))**n))/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{6ad^4x^{\frac{2}{3}}}{6d^4x^{\frac{5}{3}}+6d^3ex^2} - \frac{6ad^3ex}{6d^4x^{\frac{5}{3}}+6d^3ex^2} - \frac{6bd^4x^{\frac{2}{3}}\log\left(c\left(d+e\sqrt[3]{x}\right)^n\right)}{6d^4x^{\frac{5}{3}}+6d^3ex^2} - \frac{3bd^3enx}{6d^4x^{\frac{5}{3}}+6d^3ex^2} - \frac{6bd^3ex\log\left(c\left(d+e\sqrt[3]{x}\right)^n\right)}{6d^4x^{\frac{5}{3}}+6d^3ex^2} + \frac{3bd^2e^2nx^{\frac{4}{3}}}{6d^4x^{\frac{5}{3}}+6d^3ex^2} \\ -\frac{a}{x} - \frac{bn}{3x} - \frac{b\log\left(c\left(e\sqrt[3]{x}\right)^n\right)}{x} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.16 Problem number 465

$$\int x\left(a + b\log\left(c\left(d + ex^{2/3}\right)^n\right)\right)\,dx$$

Optimal antiderivative

$$-\frac{b\,d^2n\,x^{\frac{2}{3}}}{2e^2} + \frac{bdn\,x^{\frac{4}{3}}}{4e} - \frac{bn\,x^2}{6} + \frac{b\,d^3n\ln\left(d + e\,x^{\frac{2}{3}}\right)}{2e^3} + \frac{x^2\left(a + b\ln\left(c\left(d + e\,x^{\frac{2}{3}}\right)^n\right)\right)}{2}$$

command

```
integrate(x*(a+b*ln(c*(d+e*x**(2/3))**n)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{ax^2}{2}+b\left(-\frac{en\left(-\frac{3d^3\left(\begin{cases}\frac{x^{\frac{2}{3}}}{d} & \text{for } e=0\\ \frac{\log\left(d+ex^{\frac{2}{3}}\right)}{e} & \text{otherwise}\end{cases}\right)}{2e^3}+\frac{3d^2x^{\frac{2}{3}}}{2e^3}-\frac{3dx^{\frac{4}{3}}}{4e^2}+\frac{x^2}{2e}\right)}{3}+\frac{x^2\log\left(c\left(d+ex^{\frac{2}{3}}\right)^n\right)}{2}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.17 Problem number 494

$$\int \frac{a+b\log\left(c\left(d+\frac{e}{\sqrt[3]{x}}\right)^n\right)}{x^2}\,dx$$

Optimal antiderivative

$$\frac{bn}{3x}-\frac{bdn}{2e\,x^{\frac{2}{3}}}+\frac{b\,d^2n}{e^2x^{\frac{1}{3}}}-\frac{b\,d^3n\ln\left(d+\frac{e}{x^{\frac{1}{3}}}\right)}{e^3}+\frac{-a-b\ln\left(c\left(d+\frac{e}{x^{\frac{1}{3}}}\right)^n\right)}{x}$$

command

```
integrate((a+b*ln(c*(d+e/x**(1/3))**n))/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{6ade^3x^{\frac{7}{3}}}{6de^3x^{\frac{10}{3}}+6e^4x^3}-\frac{6ae^4x^2}{6de^3x^{\frac{10}{3}}+6e^4x^3}-\frac{6bd^4x^{\frac{10}{3}}\log\left(c\left(d+\frac{e}{\sqrt[3]{x}}\right)^n\right)}{6de^3x^{\frac{10}{3}}+6e^4x^3}+\frac{6bd^3enx^3}{6de^3x^{\frac{10}{3}}+6e^4x^3}-\frac{6bd^3ex^3\log\left(c\left(d+\frac{e}{\sqrt[3]{x}}\right)^n\right)}{6de^3x^{\frac{10}{3}}+6e^4x^3}+\frac{3bd^2e^2}{6de^3x^{\frac{10}{3}}} \\ -\frac{a+b\log\left(cd^n\right)}{x}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

41.18 Problem number 630

$$\int \log \left(c\left(d+e(f+gx)^2\right)^q\right)\,dx$$

Optimal antiderivative

$$-2qx+\frac{(gx+f)\ln\left(c\left(d+e(gx+f)^2\right)^q\right)}{g}+\frac{2q\arctan\left(\frac{(gx+f)\sqrt{e}}{\sqrt{d}}\right)\sqrt{d}}{g\sqrt{e}}$$

command

```
integrate(ln(c*(d+e*(g*x+f)**2)**q),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} x\log\left(0^q c\right) \\ x\log\left(cd^q\right) \\ x\log\left(c\left(d+ef^2\right)^q\right) \\ \frac{f\log\left(c\left(ef^2+2efgx+eg^2x^2\right)^q\right)}{g}-2qx+x\log\left(c\left(ef^2+2efgx+eg^2x^2\right)^q\right) \\ \frac{2dq\log\left(\frac{f}{g}+x-\frac{\sqrt{-de}}{eg}\right)}{g\sqrt{-de}}-\frac{d\log\left(c\left(d+ef^2+2efgx+eg^2x^2\right)^q\right)}{g\sqrt{-de}}+\frac{f\log\left(c\left(d+ef^2+2efgx+eg^2x^2\right)^q\right)}{g}-2qx+x\log\left(c\left(d+ef^2+2ef\right.\right.\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

42 Test file number 64

Test folder name:

`test_cases/3_Logarithms/64_3.5_Logarithm_functions`

42.1 Problem number 18

$$\int \frac{\left(amx^m+bnq\log^{-1+q}\left(cx^n\right)\right)\left(ax^m+b\log^q\left(cx^n\right)\right)}{x}\,dx$$

Optimal antiderivative

$$\frac{\left(a\,x^m+b\ln\left(c\,x^n\right)^q\right)^2}{2}$$

command

```
integrate((a*m*x**m+b*n*q*ln(c*x**n)**(-1+q))*(a*x**m+b*ln(c*x**n)**q)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^2x^{2m}}{2} + abx^m \log{(cx^n)}^q + \frac{b^2 \log{(cx^n)}^{2q}}{2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

42.2 Problem number 20

$$\int \frac{amx^m + bnq \log^{-1+q}(cx^n)}{x\,(ax^m + b\log^q(cx^n))}\,dx$$

Optimal antiderivative

$$\ln\left(a\,x^m + b\ln\left(c\,x^n\right)^q\right)$$

command

```
integrate((a*m*x**m+b*n*q*ln(c*x**n)**(-1+q))/x/(a*x**m+b*ln(c*x**n)**q),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \log\left(\frac{ax^m}{b} + \log{(cx^n)}^q\right) & \text{for } b \neq 0 \\ m\log{(x)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

42.3 Problem number 38

$$\int \frac{adnx^m - admx^m \log(cx^n) - bdn(-1+q)\log^q(cx^n)}{x\,(ax^m + b\log^q(cx^n))^2}\,dx$$

Optimal antiderivative

$$\frac{d\ln\left(c\,x^n\right)}{a\,x^m + b\ln\left(c\,x^n\right)^q}$$

command

```
integrate((a*d*n*x**m-a*d*m*x**m*ln(c*x**n)-b*d*n*(-1+q)*ln(c*x**n)**q)/x/(a*x**m+b*ln(c*x**n
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{d\log\left(cx^{n}\right)}{ax^{m}+b\log\left(cx^{n}\right)^{q}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

42.4 Problem number 77

$$\int\frac{\log\left(d\left(a+bx+cx^{2}\right)^{n}\right)}{x^{2}}\,dx$$

Optimal antiderivative

$$\frac{bn\ln\left(x\right)}{a}-\frac{bn\ln\left(c\,x^{2}+bx+a\right)}{2a}-\frac{\ln\left(d\left(c\,x^{2}+bx+a\right)^{n}\right)}{x}+\frac{n\,\mathrm{arctanh}\left(\frac{2cx+b}{\sqrt{-4ac+b^{2}}}\right)\sqrt{-4ac+b^{2}}}{a}$$

command

```
integrate(ln(d*(c*x**2+b*x+a)**n)/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{n}{x}-\frac{\log\left(d(bx)^{n}\right)}{x}\\ -\frac{n}{x}-\frac{\log\left(d\left(bx+cx^{2}\right)^{n}\right)}{x}-\frac{2cn\log\left(b+cx\right)}{b}+\frac{c\log\left(d\left(bx+cx^{2}\right)^{n}\right)}{b}\\ -\frac{\log\left(d(a+bx)^{n}\right)}{x}+\frac{bn\log\left(x\right)}{a}-\frac{b\log\left(d(a+bx)^{n}\right)}{a}\\ -\frac{\log\left(d\left(a+bx+cx^{2}\right)^{n}\right)}{x}+\frac{bn\log\left(x\right)}{a}-\frac{b\log\left(d\left(a+bx+cx^{2}\right)^{n}\right)}{2a}+\frac{n\sqrt{-4ac+b^{2}}\log\left(\frac{b}{2c}+x+\frac{\sqrt{-4ac+b^{2}}}{2c}\right)}{a}-\frac{\sqrt{-4ac+b^{2}}\log\left(\right.}{2a}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

43 Test file number 65

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/65_4.1.0-a_sin-^m-b_trg-^n`

43.1 Problem number 192

$$\int \frac{\sin(a+bx)}{(d\cos(a+bx))^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2}{5bd\left(d\cos\left(bx+a\right)\right)^{\frac{5}{2}}}$$

command

```
integrate(sin(b*x+a)/(d*cos(b*x+a))**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2\cos\left(a+bx\right)}{5b(d\cos\left(a+bx\right))^{\frac{7}{2}}} & \text{for } b \neq 0 \\ \frac{x\sin\left(a\right)}{(d\cos\left(a\right))^{\frac{7}{2}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

43.2 Problem number 208

$$\int \frac{\sin^3(a+bx)}{(d\cos(a+bx))^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{2}{5bd\left(d\cos\left(bx+a\right)\right)^{\frac{5}{2}}}-\frac{2}{b\,d^{3}\sqrt{d\cos\left(bx+a\right)}}$$

command

```
integrate(sin(b*x+a)**3/(d*cos(b*x+a))**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2\sin^{2}\left(a+bx\right)\cos\left(a+bx\right)}{5b(d\cos\left(a+bx\right))^{\frac{7}{2}}}-\frac{8\cos^{3}\left(a+bx\right)}{5b(d\cos\left(a+bx\right))^{\frac{7}{2}}} & \text{for } b \neq 0 \\ \frac{x\sin^{3}\left(a\right)}{(d\cos\left(a\right))^{\frac{7}{2}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

43.3 Problem number 255

$$\int \cos^3(x)\sin^{\frac{5}{2}}(x)\,dx$$

Optimal antiderivative

$$\frac{2\left(\sin^{\frac{7}{2}}(x)\right)}{7}-\frac{2\left(\sin^{\frac{11}{2}}(x)\right)}{11}$$

command

```
integrate(cos(x)**3*sin(x)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{8\sin^{\frac{11}{2}}(x)}{77}+\frac{2\sin^{\frac{7}{2}}(x)\cos^2(x)}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

44 Test file number 66

Test folder name:

```
test_cases/4_Trig_functions/4.1_Sine/66_4.1.10-c+d_x-^m-a+b_sin-^n
```

44.1 Problem number 227

$$\int \frac{\sin^2(c+dx)}{a+b\sin(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{ax}{b^2}-\frac{\cos(dx+c)}{bd}+\frac{2a^2\arctan\left(\frac{b+a\tan\left(\frac{dx}{2}+\frac{c}{2}\right)}{\sqrt{a^2-b^2}}\right)}{b^2d\sqrt{a^2-b^2}}$$

command

```
integrate(sin(d*x+c)**2/(a+b*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

44.2 Problem number 301

$$\int \frac{\cos^2(c+dx)}{a+b\sin(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{ax}{b^2}+\frac{\cos\left(dx+c\right)}{bd}-\frac{2\arctan\left(\frac{b+a\tan\left(\frac{dx}{2}+\frac{c}{2}\right)}{\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2d}$$

command

```
integrate(cos(d*x+c)**2/(a+b*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

45 Test file number 69

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/69_4.1.12-e_x-^m-a+b_sin-c+d_x^n-^p`

45.1 Problem number 145

$$\int x^{-1+2n}\sin\left(a+bx^n\right)\,dx$$

Optimal antiderivative

$$-\frac{x^n\cos\left(a+b\,x^n\right)}{bn}+\frac{\sin\left(a+b\,x^n\right)}{b^2n}$$

command

```
integrate(x**(-1+2*n)*sin(a+b*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\log\left(x\right)\sin\left(a\right) & \text{for } b=0\wedge n=0\\ \frac{x^{2n}\sin\left(a\right)}{2n} & \text{for } b=0\\ \log\left(x\right)\sin\left(a+b\right) & \text{for } n=0\\ -\frac{x^n\cos\left(a+bx^n\right)}{bn}+\frac{\sin\left(a+bx^n\right)}{b^2n} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

45.2 Problem number 146

$$\int x^{-1+2n} \cos\left(a+bx^n\right)\,dx$$

Optimal antiderivative

$$\frac{\cos\left(a+b\,x^n\right)}{b^2n}+\frac{x^n\sin\left(a+b\,x^n\right)}{bn}$$

command

```
integrate(x**(-1+2*n)*cos(a+b*x**n),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \log\left(x\right)\cos\left(a\right) & \text{for } b=0\wedge n=0 \\ \frac{x^{2n}\cos\left(a\right)}{2n} & \text{for } b=0 \\ \log\left(x\right)\cos\left(a+b\right) & \text{for } n=0 \\ \frac{x^n\sin\left(a+bx^n\right)}{bn}+\frac{\cos\left(a+bx^n\right)}{b^2n} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

46 Test file number 70

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/70_4.1.1.2-g_cos-^p-a+b_sin-^m`

46.1 Problem number 75

$$\int \frac{\cos^8(c+dx)}{(a+a\sin(c+dx))^3}\,dx$$

Optimal antiderivative

$$\frac{7x}{8a^3}+\frac{7\left(\cos^5\left(dx+c\right)\right)}{15a^3d}+\frac{7\cos\left(dx+c\right)\sin\left(dx+c\right)}{8a^3d}+\frac{7\left(\cos^3\left(dx+c\right)\right)\sin\left(dx+c\right)}{12a^3d}+\frac{2\left(\cos^7\left(dx+c\right)\right)}{3ad\left(a+a\sin\left(dx+c\right)\right)^2}$$

command

```
integrate(cos(d*x+c)**8/(a+a*sin(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

46.2 Problem number 92

$$\int \frac{\cos^4(c+dx)}{(a+a\sin(c+dx))^8}\,dx$$

Optimal antiderivative

$$-\frac{\cos^5(dx+c)}{11d(a+a\sin(dx+c))^8}-\frac{\cos^5(dx+c)}{33ad(a+a\sin(dx+c))^7}-\frac{2(\cos^5(dx+c))}{231a^2d(a+a\sin(dx+c))^6}-\frac{2(\cos^5(dx+c))}{1155a^3d(a+a\sin(dx+c))^5}$$

command

```
integrate(cos(d*x+c)**4/(a+a*sin(d*x+c))**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

46.3 Problem number 94

$$\int \frac{\cos^2(c+dx)}{(a+a\sin(c+dx))^8}\,dx$$

Optimal antiderivative

$$-\frac{\cos^3(dx+c)}{13d(a+a\sin(dx+c))^8}-\frac{5(\cos^3(dx+c))}{143ad(a+a\sin(dx+c))^7}-\frac{20(\cos^3(dx+c))}{1287a^2d(a+a\sin(dx+c))^6}-\frac{20(\cos^3(dx+c))}{3003a^3d(a+a\sin(dx+c))^5}-\frac{8(\cos^3(dx+c))}{3003d(a^2+a^2\sin(dx+c))^4}-\frac{8(\cos^3(dx+c))}{9009a^2d(a^2+a^2\sin(dx+c))^3}$$

command

```
integrate(cos(d*x+c)**2/(a+a*sin(d*x+c))**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

46.4 Problem number 129

$$\int \cos^3(c+dx)(a+a\sin(c+dx))^{5/2}\,dx$$

Optimal antiderivative

$$\frac{4(a+a\sin(dx+c))^{\frac{9}{2}}}{9a^2d}-\frac{2(a+a\sin(dx+c))^{\frac{11}{2}}}{11a^3d}$$

command

```
integrate(cos(d*x+c)**3*(a+a*sin(d*x+c))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{8a^2\sqrt{a\sin(c+dx)+a}\sin^5(c+dx)}{77d}+\frac{272a^2\sqrt{a\sin(c+dx)+a}\sin^4(c+dx)}{693d}+\frac{2a^2\sqrt{a\sin(c+dx)+a}\sin^3(c+dx)\cos^2(c\\ x(a\sin(c)+a)^{\frac{5}{2}}\cos^3(c)\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

46.5 Problem number 131

$$\int \cos(c+dx)(a+a\sin(c+dx))^{5/2}\,dx$$

Optimal antiderivative

$$\frac{2(a+a\sin(dx+c))^{\frac{7}{2}}}{7ad}$$

command

```
integrate(cos(d*x+c)*(a+a*sin(d*x+c))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{2a^2\sqrt{a\sin(c+dx)+a}\sin^3(c+dx)}{7d}+\frac{6a^2\sqrt{a\sin(c+dx)+a}\sin^2(c+dx)}{7d}+\frac{6a^2\sqrt{a\sin(c+dx)+a}\sin(c+dx)}{7d}+2a^2\surd\\ x(a\sin(c)+a)^{\frac{5}{2}}\cos(c)\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

46.6 Problem number 433

$$\int \frac{\cos^2(c+dx)}{a+b\sin(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{ax}{b^2}+\frac{\cos(dx+c)}{bd}-\frac{2\arctan\left(\frac{b+a\tan\left(\frac{dx}{2}+\frac{c}{2}\right)}{\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2d}$$

command

```
integrate(cos(d*x+c)**2/(a+b*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

46.7 Problem number 495

$$\int \cos^3(c+dx)(a+b\sin(c+dx))^{5/2}\,dx$$

Optimal antiderivative

$$-\frac{2(a^2-b^2)(a+b\sin(dx+c))^{\frac{7}{2}}}{7b^3d}+\frac{4a(a+b\sin(dx+c))^{\frac{9}{2}}}{9b^3d}-\frac{2(a+b\sin(dx+c))^{\frac{11}{2}}}{11b^3d}$$

command

```
integrate(cos(d*x+c)**3*(a+b*sin(d*x+c))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^{\frac{5}{2}}x\cos^3(c) \\ a^{\frac{5}{2}}\cdot\left(\frac{2\sin^3(c+dx)}{3d}+\frac{\sin(c+dx)\cos^2(c+dx)}{d}\right) \\ x(a+b\sin(c))^{\frac{5}{2}}\cos^3(c) \\ -\frac{16a^5\sqrt{a+b\sin(c+dx)}}{693b^3d}+\frac{8a^4\sqrt{a+b\sin(c+dx)}\sin(c+dx)}{693b^2d}+\frac{64a^3\sqrt{a+b\sin(c+dx)}\sin^2(c+dx)}{231bd}+\frac{2a^3\sqrt{a+b\text{s}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

46.8 Problem number 496

$$\int \cos(c+dx)(a+b\sin(c+dx))^{5/2}\,dx$$

Optimal antiderivative

$$\frac{2(a+b\sin(dx+c))^{\frac{7}{2}}}{7bd}$$

command

```
integrate(cos(d*x+c)*(a+b*sin(d*x+c))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} a^{\frac{5}{2}}x\cos(c) \\ \frac{a^{\frac{5}{2}}\sin(c+dx)}{d} \\ x(a+b\sin(c))^{\frac{5}{2}}\cos(c) \\ \frac{2a^3\sqrt{a+b\sin(c+dx)}}{7bd} + \frac{6a^2\sqrt{a+b\sin(c+dx)}\sin(c+dx)}{7d} + \frac{6ab\sqrt{a+b\sin(c+dx)}\sin^2(c+dx)}{7d} + \frac{2b^2\sqrt{a+b\sin(c}}{} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

46.9 Problem number 632

$$\int \cos^3(c+dx)(a+b\sin(c+dx))^m\,dx$$

Optimal antiderivative

$$-\frac{(a^2-b^2)(a+b\sin(dx+c))^{1+m}}{b^3d(1+m)} + \frac{2a(a+b\sin(dx+c))^{2+m}}{b^3d(2+m)} - \frac{(a+b\sin(dx+c))^{3+m}}{b^3d(3+m)}$$

command

```
integrate(cos(d*x+c)**3*(a+b*sin(d*x+c))**m,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47 Test file number 73

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/73_4.1.2.1-a+b_sin-^m-c+d_sin-^n`

47.1 Problem number 178

$$\int \frac{\sin^2(x)}{a+b\sin(x)}\,dx$$

Optimal antiderivative

$$-\frac{ax}{b^2}-\frac{\cos(x)}{b}+\frac{2a^2\arctan\left(\frac{b+a\tan\left(\frac{x}{2}\right)}{\sqrt{a^2-b^2}}\right)}{b^2\sqrt{a^2-b^2}}$$

command

`integrate(sin(x)**2/(a+b*sin(x)),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.2 Problem number 260

$$\int \frac{(a+a\sin(e+fx))^3}{(c-c\sin(e+fx))^8}\,dx$$

Optimal antiderivative

$$\frac{a^3c^3(\cos^7(fx+e))}{15f(c-c\sin(fx+e))^{11}}+\frac{4a^3c^2(\cos^7(fx+e))}{195f(c-c\sin(fx+e))^{10}}+\frac{4a^3c(\cos^7(fx+e))}{715f(c-c\sin(fx+e))^9}+\frac{8a^3(\cos^7(fx+e))}{6435f(c-c\sin(fx+e))^8}+\frac{8a^3(\cos^7(fx+e))}{45045cf(c-c\sin(fx+e))^7}$$

command

`integrate((a+a*sin(f*x+e))**3/(c-c*sin(f*x+e))**8,x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.3 Problem number 439

$$\int \frac{(a+a\sin(e+fx))^2}{c+d\sin(e+fx)}\,dx$$

Optimal antiderivative

$$-\frac{a^2(c-2d)\,x}{d^2}-\frac{a^2\cos\left(fx+e\right)}{df}+\frac{2a^2(c-d)^2\arctan\left(\frac{d+c\tan\left(\frac{fx}{2}+\frac{e}{2}\right)}{\sqrt{c^2-d^2}}\right)}{d^2f\sqrt{c^2-d^2}}$$

command

```
integrate((a+a*sin(f*x+e))**2/(c+d*sin(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.4 Problem number 458

$$\int \frac{1}{(a+a\sin(e+fx))(c+d\sin(e+fx))}\,dx$$

Optimal antiderivative

$$-\frac{\cos\left(fx+e\right)}{\left(c-d\right)f\left(a+a\sin\left(fx+e\right)\right)}-\frac{2d\arctan\left(\frac{d+c\tan\left(\frac{fx}{2}+\frac{e}{2}\right)}{\sqrt{c^2-d^2}}\right)}{a\left(c-d\right)f\sqrt{c^2-d^2}}$$

command

```
integrate(1/(a+a*sin(f*x+e))/(c+d*sin(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.5 Problem number 461

$$\int \frac{(c + d\sin(e + fx))^5}{(a + a\sin(e + fx))^2}\,dx$$

Optimal antiderivative

$$\frac{5(2c-d)\,d^2\left(2c^2-3cd+2d^2\right)x}{2a^2}+\frac{2d\left(c^4+10c^3d-44c^2d^2+40c\,d^3-12d^4\right)\cos\left(fx+e\right)}{3a^2f}$$
$$+\frac{d^2\left(2c^3+20c^2d-57c\,d^2+30d^3\right)\cos\left(fx+e\right)\sin\left(fx+e\right)}{6a^2f}$$
$$+\frac{d\left(c^2+10cd-12d^2\right)\cos\left(fx+e\right)\left(c+d\sin\left(fx+e\right)\right)^2}{3a^2f}$$
$$-\frac{(c-d)\left(c+10d\right)\cos\left(fx+e\right)\left(c+d\sin\left(fx+e\right)\right)^3}{3a^2f\left(1+\sin\left(fx+e\right)\right)}$$
$$-\frac{(c-d)\cos\left(fx+e\right)\left(c+d\sin\left(fx+e\right)\right)^4}{3f\left(a+a\sin\left(fx+e\right)\right)^2}$$

command

```
integrate((c+d*sin(f*x+e))**5/(a+a*sin(f*x+e))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.6 Problem number 470

$$\int \frac{(c + d\sin(e + fx))^6}{(a + a\sin(e + fx))^3}\,dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{d^3(40c^3-90c^2d+78c\,d^2-23d^3)\,x}{2a^3}\\
&+\frac{2d(2c^5+18c^4d+107c^3d^2-472c^2d^3+456c\,d^4-136d^5)\cos(fx+e)}{15a^3f}\\
&+\frac{d^2(4c^4+36c^3d+216c^2d^2-626c\,d^3+345d^4)\cos(fx+e)\sin(fx+e)}{30a^3f}\\
&+\frac{d(2c^3+18c^2d+111c\,d^2-136d^3)\cos(fx+e)\,(c+d\sin(fx+e))^2}{15a^3f}\\
&-\frac{(c-d)\,(2c^2+18cd+115d^2)\cos(fx+e)\,(c+d\sin(fx+e))^3}{15f\,(a^3+a^3\sin(fx+e))}\\
&-\frac{(c-d)\,(2c+13d)\cos(fx+e)\,(c+d\sin(fx+e))^4}{15af\,(a+a\sin(fx+e))^2}\\
&-\frac{(c-d)\cos(fx+e)\,(c+d\sin(fx+e))^5}{5f\,(a+a\sin(fx+e))^3}
\end{aligned}$$

command

```
integrate((c+d*sin(f*x+e))**6/(a+a*sin(f*x+e))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.7 Problem number 471

$$\int\frac{(c+d\sin(e+fx))^5}{(a+a\sin(e+fx))^3}\,dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{d^3(20c^2-30cd+13d^2)\,x}{2a^3}+\frac{2d(2c^4+15c^3d+72c^2d^2-180c\,d^3+76d^4)\cos(fx+e)}{15a^3f}\\
&+\frac{d^2(4c^3+30c^2d+146c\,d^2-195d^3)\cos(fx+e)\sin(fx+e)}{30a^3f}\\
&-\frac{(c-d)\,(2c^2+15cd+76d^2)\cos(fx+e)\,(c+d\sin(fx+e))^2}{15f\,(a^3+a^3\sin(fx+e))}\\
&-\frac{(c-d)\,(2c+11d)\cos(fx+e)\,(c+d\sin(fx+e))^3}{15af\,(a+a\sin(fx+e))^2}\\
&-\frac{(c-d)\cos(fx+e)\,(c+d\sin(fx+e))^4}{5f\,(a+a\sin(fx+e))^3}
\end{aligned}$$

command

```
integrate((c+d*sin(f*x+e))**5/(a+a*sin(f*x+e))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.8 Problem number 682

$$\int \frac{(a + b\sin(e + fx))^2}{c + d\sin(e + fx)}\,dx$$

Optimal antiderivative

$$-\frac{b(-2ad + bc)\,x}{d^2} - \frac{b^2\cos(fx + e)}{df} + \frac{2(-ad + bc)^2\arctan\left(\frac{d + c\tan\left(\frac{fx}{2} + \frac{e}{2}\right)}{\sqrt{c^2 - d^2}}\right)}{d^2 f\sqrt{c^2 - d^2}}$$

command

```
integrate((a+b*sin(f*x+e))**2/(c+d*sin(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

47.9 Problem number 700

$$\int \frac{(c + d\sin(e + fx))^2}{a + b\sin(e + fx)}\,dx$$

Optimal antiderivative

$$\frac{d(-ad + 2bc)\,x}{b^2} - \frac{d^2\cos(fx + e)}{bf} + \frac{2(-ad + bc)^2\arctan\left(\frac{b + a\tan\left(\frac{fx}{2} + \frac{e}{2}\right)}{\sqrt{a^2 - b^2}}\right)}{b^2 f\sqrt{a^2 - b^2}}$$

command

```
integrate((c+d*sin(f*x+e))**2/(a+b*sin(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48 Test file number 74

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/74_4.1.2.2-g_cos-^p-a+b_sin-^m-c+d_sin-^n`

48.1 Problem number 420

$$\int \frac{\cos^4(c+dx)\sin^5(c+dx)}{(a+a\sin(c+dx))^2}\,dx$$

Optimal antiderivative

$$-\frac{5x}{8a^2}-\frac{2\cos(dx+c)}{a^2d}+\frac{5\left(\cos^3(dx+c)\right)}{3a^2d}-\frac{4\left(\cos^5(dx+c)\right)}{5a^2d}+\frac{\cos^7(dx+c)}{7a^2d}+\frac{5\cos(dx+c)\sin(dx+c)}{8a^2d}+\frac{5\cos(dx+c)\left(\sin^3(dx+c)\right)}{12a^2d}+\frac{\cos(dx+c)\left(\sin^5(dx+c)\right)}{3a^2d}$$

command

```
integrate(cos(d*x+c)**4*sin(d*x+c)**5/(a+a*sin(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.2 Problem number 440

$$\int \frac{\cos^4(e+fx)\sin(e+fx)}{(a+a\sin(e+fx))^6}\,dx$$

Optimal antiderivative

$$\frac{\cos^5(fx+e)}{7f\,(a+a\sin(fx+e))^6}-\frac{6\left(\cos^5(fx+e)\right)}{35af\,(a+a\sin(fx+e))^5}$$

command

```
integrate(cos(f*x+e)**4*sin(f*x+e)/(a+a*sin(f*x+e))**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.3 Problem number 554

$$\int \frac{\cos^5(c+dx)\sin^3(c+dx)}{(a+a\sin(c+dx))^3}\,dx$$

Optimal antiderivative

$$-\frac{4\ln(1+\sin(dx+c))}{a^3d}+\frac{4\sin(dx+c)}{a^3d}-\frac{2\left(\sin^2(dx+c)\right)}{a^3d}+\frac{4\left(\sin^3(dx+c)\right)}{3a^3d}-\frac{3\left(\sin^4(dx+c)\right)}{4a^3d}+\frac{\sin^5(dx+c)}{5a^3d}$$

command

```
integrate(cos(d*x+c)**5*sin(d*x+c)**3/(a+a*sin(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.4 Problem number 565

$$\int \cos^5(c+dx)\sin^n(c+dx)(a+a\sin(c+dx))^3\,dx$$

Optimal antiderivative

$$\frac{a^3(\sin^{1+n}(dx+c))}{d(1+n)}+\frac{3a^3(\sin^{2+n}(dx+c))}{d(2+n)}+\frac{a^3(\sin^{3+n}(dx+c))}{d(3+n)}-\frac{5a^3(\sin^{4+n}(dx+c))}{d(4+n)}-\frac{5a^3(\sin^{5+n}(dx+c))}{d(5+n)}+\frac{a^3(\sin^{6+n}(dx+c))}{d(6+n)}+\frac{3a^3(\sin^{7+n}(dx+c))}{d(7+n)}+\frac{a^3(\sin^{8+n}(dx+c))}{d(8+n)}$$

command

```
integrate(cos(d*x+c)**5*sin(d*x+c)**n*(a+a*sin(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.5 Problem number 566

$$\int \cos^5(c+dx)\sin^n(c+dx)(a+a\sin(c+dx))^2\,dx$$

Optimal antiderivative

$$\frac{a^2(\sin^{1+n}(dx+c))}{d(1+n)}+\frac{2a^2(\sin^{2+n}(dx+c))}{d(2+n)}-\frac{a^2(\sin^{3+n}(dx+c))}{d(3+n)}-\frac{4a^2(\sin^{4+n}(dx+c))}{d(4+n)}-\frac{a^2(\sin^{5+n}(dx+c))}{d(5+n)}+\frac{2a^2(\sin^{6+n}(dx+c))}{d(6+n)}+\frac{a^2(\sin^{7+n}(dx+c))}{d(7+n)}$$

command

```
integrate(cos(d*x+c)**5*sin(d*x+c)**n*(a+a*sin(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.6 Problem number 567

$$\int \cos^5(c+dx)\sin^n(c+dx)(a+a\sin(c+dx))\,dx$$

Optimal antiderivative

$$\frac{a\left(\sin^{1+n}(dx+c)\right)}{d(1+n)}+\frac{a\left(\sin^{2+n}(dx+c)\right)}{d(2+n)}-\frac{2a\left(\sin^{3+n}(dx+c)\right)}{d(3+n)}-\frac{2a\left(\sin^{4+n}(dx+c)\right)}{d(4+n)}+\frac{a\left(\sin^{5+n}(dx+c)\right)}{d(5+n)}+\frac{a\left(\sin^{6+n}(dx+c)\right)}{d(6+n)}$$

command

```
integrate(cos(d*x+c)**5*sin(d*x+c)**n*(a+a*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.7 Problem number 624

$$\int \frac{\cos^6(c+dx)\sin^4(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{3x}{128a}+\frac{\cos^5(dx+c)}{5ad}-\frac{2\left(\cos^7(dx+c)\right)}{7ad}+\frac{\cos^9(dx+c)}{9ad}+\frac{3\cos(dx+c)\sin(dx+c)}{128ad}+\frac{\left(\cos^3(dx+c)\right)\sin(dx+c)}{64ad}-\frac{\left(\cos^5(dx+c)\right)\sin(dx+c)}{16ad}-\frac{\left(\cos^5(dx+c)\right)\left(\sin^3(dx+c)\right)}{8ad}$$

command

```
integrate(cos(d*x+c)**6*sin(d*x+c)**4/(a+a*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.8 Problem number 634

$$\int \frac{\cos^6(c+dx)\sin^3(c+dx)}{(a+a\sin(c+dx))^2}\,dx$$

Optimal antiderivative

$$-\frac{x}{8a^2}-\frac{2\left(\cos^3(dx+c)\right)}{3a^2d}+\frac{3\left(\cos^5(dx+c)\right)}{5a^2d}-\frac{\cos^7(dx+c)}{7a^2d}-\frac{\cos(dx+c)\sin(dx+c)}{8a^2d}+\frac{\left(\cos^3(dx+c)\right)\sin(dx+c)}{4a^2d}+\frac{\left(\cos^3(dx+c)\right)\left(\sin^3(dx+c)\right)}{3a^2d}$$

command

```
integrate(cos(d*x+c)**6*sin(d*x+c)**3/(a+a*sin(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.9 Problem number 644

$$\int \frac{\cos^6(c+dx)\sin^3(c+dx)}{(a+a\sin(c+dx))^3}\,dx$$

Optimal antiderivative

$$-\frac{23x}{16a^3}-\frac{4\cos(dx+c)}{a^3d}+\frac{7\left(\cos^3(dx+c)\right)}{3a^3d}-\frac{3\left(\cos^5(dx+c)\right)}{5a^3d}+\frac{23\cos(dx+c)\sin(dx+c)}{16a^3d}+\frac{23\cos(dx+c)\left(\sin^3(dx+c)\right)}{24a^3d}+\frac{\cos(dx+c)\left(\sin^5(dx+c)\right)}{6a^3d}$$

command

```
integrate(cos(d*x+c)**6*sin(d*x+c)**3/(a+a*sin(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.10 Problem number 645

$$\int \frac{\cos^6(c+dx)\sin^2(c+dx)}{(a+a\sin(c+dx))^3}\,dx$$

Optimal antiderivative

$$\frac{13x}{8a^3}+\frac{4\cos(dx+c)}{a^3d}-\frac{5(\cos^3(dx+c))}{3a^3d}+\frac{\cos^5(dx+c)}{5a^3d}-\frac{13\cos(dx+c)\sin(dx+c)}{8a^3d}-\frac{3\cos(dx+c)\left(\sin^3(dx+c)\right)}{4a^3d}$$

command

```
integrate(cos(d*x+c)**6*sin(d*x+c)**2/(a+a*sin(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.11 Problem number 678

$$\int \frac{\cos^7(c+dx)\sin^5(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{\sin^6(dx+c)}{6ad}-\frac{\sin^7(dx+c)}{7ad}-\frac{\sin^8(dx+c)}{4ad}+\frac{2(\sin^9(dx+c))}{9ad}+\frac{\sin^{10}(dx+c)}{10ad}-\frac{\sin^{11}(dx+c)}{11ad}$$

command

```
integrate(cos(d*x+c)**7*sin(d*x+c)**5/(a+a*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.12 Problem number 679

$$\int \frac{\cos^7(c+dx)\sin^4(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{\sin^5(dx+c)}{5ad}-\frac{\sin^6(dx+c)}{6ad}-\frac{2(\sin^7(dx+c))}{7ad}+\frac{\sin^8(dx+c)}{4ad}+\frac{\sin^9(dx+c)}{9ad}-\frac{\sin^{10}(dx+c)}{10ad}$$

command

```
integrate(cos(d*x+c)**7*sin(d*x+c)**4/(a+a*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.13 Problem number 697

$$\int \cos^7(c+dx)\sin^n(c+dx)(a+a\sin(c+dx))^3\,dx$$

Optimal antiderivative

$$\frac{a^3(\sin^{1+n}(dx+c))}{d(1+n)}+\frac{3a^3(\sin^{2+n}(dx+c))}{d(2+n)}-\frac{8a^3(\sin^{4+n}(dx+c))}{d(4+n)}-\frac{6a^3(\sin^{5+n}(dx+c))}{d(5+n)}+\frac{6a^3(\sin^{6+n}(dx+c))}{d(6+n)}+\frac{8a^3(\sin^{7+n}(dx+c))}{d(7+n)}-\frac{3a^3(\sin^{9+n}(dx+c))}{d(9+n)}-\frac{a^3(\sin^{10+n}(dx+c))}{d(10+n)}$$

command

```
integrate(cos(d*x+c)**7*sin(d*x+c)**n*(a+a*sin(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.14 Problem number 698

$$\int \cos^7(c+dx)\sin^n(c+dx)(a+a\sin(c+dx))^2\,dx$$

Optimal antiderivative

$$\frac{a^2(\sin^{1+n}(dx+c))}{d(1+n)}+\frac{2a^2(\sin^{2+n}(dx+c))}{d(2+n)}-\frac{2a^2(\sin^{3+n}(dx+c))}{d(3+n)}-\frac{6a^2(\sin^{4+n}(dx+c))}{d(4+n)}+\frac{6a^2(\sin^{6+n}(dx+c))}{d(6+n)}+\frac{2a^2(\sin^{7+n}(dx+c))}{d(7+n)}-\frac{2a^2(\sin^{8+n}(dx+c))}{d(8+n)}-\frac{a^2(\sin^{9+n}(dx+c))}{d(9+n)}$$

command

```
integrate(cos(d*x+c)**7*sin(d*x+c)**n*(a+a*sin(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.15 Problem number 699

$$\int \cos^7(c+dx)\sin^n(c+dx)(a+a\sin(c+dx))\,dx$$

Optimal antiderivative

$$\frac{a(\sin^{1+n}(dx+c))}{d(1+n)}+\frac{a(\sin^{2+n}(dx+c))}{d(2+n)}-\frac{3a(\sin^{3+n}(dx+c))}{d(3+n)}-\frac{3a(\sin^{4+n}(dx+c))}{d(4+n)}+\frac{3a(\sin^{5+n}(dx+c))}{d(5+n)}+\frac{3a(\sin^{6+n}(dx+c))}{d(6+n)}-\frac{a(\sin^{7+n}(dx+c))}{d(7+n)}-\frac{a(\sin^{8+n}(dx+c))}{d(8+n)}$$

command

```
integrate(cos(d*x+c)**7*sin(d*x+c)**n*(a+a*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.16 Problem number 706

$$\int \frac{\cos^8(c+dx)\sin^4(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{3x}{256a}+\frac{\cos^7(dx+c)}{7ad}-\frac{2(\cos^9(dx+c))}{9ad}+\frac{\cos^{11}(dx+c)}{11ad}+\frac{3\cos(dx+c)\sin(dx+c)}{256ad}+\frac{(\cos^3(dx+c))\sin(dx+c)}{128ad}+\frac{(\cos^5(dx+c))\sin(dx+c)}{160ad}-\frac{3(\cos^7(dx+c))\sin(dx+c)}{80ad}-\frac{(\cos^7(dx+c))(\sin^3(dx+c))}{10ad}$$

command

```
integrate(cos(d*x+c)**8*sin(d*x+c)**4/(a+a*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.17 Problem number 707

$$\int \frac{\cos^8(c+dx)\sin^3(c+dx)}{a+a\sin(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{3x}{256a}-\frac{\cos^7(dx+c)}{7ad}+\frac{\cos^9(dx+c)}{9ad}-\frac{3\cos(dx+c)\sin(dx+c)}{256ad}-\frac{(\cos^3(dx+c))\sin(dx+c)}{128ad}-\frac{(\cos^5(dx+c))\sin(dx+c)}{160ad}+\frac{3(\cos^7(dx+c))\sin(dx+c)}{80ad}+\frac{(\cos^7(dx+c))(\sin^3(dx+c))}{10ad}$$

command

```
integrate(cos(d*x+c)**8*sin(d*x+c)**3/(a+a*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.18 Problem number 725

$$\int \frac{\cos^8(c+dx)\sin^2(c+dx)}{(a+a\sin(c+dx))^2}\,dx$$

Optimal antiderivative

$$\frac{11x}{128a^2}+\frac{2(\cos^5(dx+c))}{5a^2d}-\frac{2(\cos^7(dx+c))}{7a^2d}+\frac{11\cos(dx+c)\sin(dx+c)}{128a^2d}+\frac{11(\cos^3(dx+c))\sin(dx+c)}{192a^2d}-\frac{11(\cos^5(dx+c))\sin(dx+c)}{48a^2d}-\frac{(\cos^5(dx+c))(\sin^3(dx+c))}{8a^2d}$$

command

```
integrate(cos(d*x+c)**8*sin(d*x+c)**2/(a+a*sin(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.19 Problem number 741

$$\int \frac{\cos^8(c+dx)\sin(c+dx)}{(a+a\sin(c+dx))^3}\,dx$$

Optimal antiderivative

$$-\frac{7x}{16a^3}-\frac{7(\cos^5(dx+c))}{30a^3d}-\frac{7\cos(dx+c)\sin(dx+c)}{16a^3d}-\frac{7(\cos^3(dx+c))\sin(dx+c)}{24a^3d}-\frac{\cos^9(dx+c)}{3d(a+a\sin(dx+c))^3}-\frac{\cos^7(dx+c)}{6d(a^3+a^3\sin(dx+c))}$$

command

```
integrate(cos(d*x+c)**8*sin(d*x+c)/(a+a*sin(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.20 Problem number 1021

$$\int \cos^5(e+fx)(a+a\sin(e+fx))^m(A+B\sin(e+fx))\,dx$$

Optimal antiderivative

$$\frac{4(A-B)\,(a+a\sin\left(fx+e\right))^{3+m}}{a^3f\,(3+m)}-\frac{4(A-2B)\,(a+a\sin\left(fx+e\right))^{4+m}}{a^4f\,(4+m)}+\frac{(A-5B)\,(a+a\sin\left(fx+e\right))^{5+m}}{a^5f\,(5+m)}+\frac{B(a+a\sin\left(fx+e\right))^{6+m}}{a^6f\,(6+m)}$$

command

```
integrate(cos(f*x+e)**5*(a+a*sin(f*x+e))**m*(A+B*sin(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

48.21 Problem number 1235

$$\int \cos^5(c+dx)\sin^n(c+dx)(a+b\sin(c+dx))^2\,dx$$

Optimal antiderivative

$$\frac{a^2\left(\sin^{1+n}\left(dx+c\right)\right)}{d\,(1+n)}+\frac{2ab\left(\sin^{2+n}\left(dx+c\right)\right)}{d\,(2+n)}-\frac{\left(2a^2-b^2\right)\left(\sin^{3+n}\left(dx+c\right)\right)}{d\,(3+n)}-\frac{4ab\left(\sin^{4+n}\left(dx+c\right)\right)}{d\,(4+n)}+\frac{\left(a^2-2b^2\right)\left(\sin^{5+n}\left(dx+c\right)\right)}{d\,(5+n)}+\frac{2ab\left(\sin^{6+n}\left(dx+c\right)\right)}{d\,(6+n)}+\frac{b^2\left(\sin^{7+n}\left(dx+c\right)\right)}{d\,(7+n)}$$

command

```
integrate(cos(d*x+c)**5*sin(d*x+c)**n*(a+b*sin(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49 Test file number 76

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/76_4.1.3.1-a+b_sin-^m-c+d_sin-^n-A+B_sin-`

49.1 Problem number 37

$$\int \frac{(a+a\sin(e+fx))^2(A+B\sin(e+fx))}{(c-c\sin(e+fx))^7}\,dx$$

Optimal antiderivative

$$\frac{a^2(A+B)\,c^2\left(\cos^5\left(fx+e\right)\right)}{13f\left(c-c\sin\left(fx+e\right)\right)^9}+\frac{a^2(4A-9B)\,c\left(\cos^5\left(fx+e\right)\right)}{143f\left(c-c\sin\left(fx+e\right)\right)^8}+\frac{a^2(4A-9B)\left(\cos^5\left(fx+e\right)\right)}{429f\left(c-c\sin\left(fx+e\right)\right)^7}+\frac{2a^2(4A-9B)\left(\cos^5\left(fx+e\right)\right)}{3003cf\left(c-c\sin\left(fx+e\right)\right)^6}+\frac{2a^2(4A-9B)\left(\cos^5\left(fx+e\right)\right)}{15015c^2f\left(c-c\sin\left(fx+e\right)\right)^5}$$

command

```
integrate((a+a*sin(f*x+e))**2*(A+B*sin(f*x+e))/(c-c*sin(f*x+e))**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.2 Problem number 49

$$\int \frac{(a+a\sin(e+fx))^3(A+B\sin(e+fx))}{(c-c\sin(e+fx))^6}\,dx$$

Optimal antiderivative

$$\frac{a^3(A+B)\,c^3\left(\cos^7\left(fx+e\right)\right)}{11f\left(c-c\sin\left(fx+e\right)\right)^9}+\frac{a^3(2A-9B)\,c^2\left(\cos^7\left(fx+e\right)\right)}{99f\left(c-c\sin\left(fx+e\right)\right)^8}+\frac{a^3(2A-9B)\,c\left(\cos^7\left(fx+e\right)\right)}{693f\left(c-c\sin\left(fx+e\right)\right)^7}$$

command

```
integrate((a+a*sin(f*x+e))**3*(A+B*sin(f*x+e))/(c-c*sin(f*x+e))**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.3 Problem number 50

$$\int \frac{(a + a\sin(e + fx))^3(A + B\sin(e + fx))}{(c - c\sin(e + fx))^7}\,dx$$

Optimal antiderivative

$$\frac{a^3(A+B)\,c^3\left(\cos^7(fx+e)\right)}{13f\,(c-c\sin(fx+e))^{10}}+\frac{a^3(3A-10B)\,c^2\left(\cos^7(fx+e)\right)}{143f\,(c-c\sin(fx+e))^{9}}+\frac{2a^3(3A-10B)\,c\left(\cos^7(fx+e)\right)}{1287f\,(c-c\sin(fx+e))^{8}}+\frac{2a^3(3A-10B)\left(\cos^7(fx+e)\right)}{9009f\,(c-c\sin(fx+e))^{7}}$$

command

```
integrate((a+a*sin(f*x+e))**3*(A+B*sin(f*x+e))/(c-c*sin(f*x+e))**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.4 Problem number 51

$$\int \frac{(a + a\sin(e + fx))^3(A + B\sin(e + fx))}{(c - c\sin(e + fx))^8}\,dx$$

Optimal antiderivative

$$\frac{a^3(A+B)\,c^3\left(\cos^7(fx+e)\right)}{15f\,(c-c\sin(fx+e))^{11}}+\frac{a^3(4A-11B)\,c^2\left(\cos^7(fx+e)\right)}{195f\,(c-c\sin(fx+e))^{10}}+\frac{a^3(4A-11B)\,c\left(\cos^7(fx+e)\right)}{715f\,(c-c\sin(fx+e))^{9}}+\frac{2a^3(4A-11B)\left(\cos^7(fx+e)\right)}{6435f\,(c-c\sin(fx+e))^{8}}+\frac{2a^3(4A-11B)\left(\cos^7(fx+e)\right)}{45045cf\,(c-c\sin(fx+e))^{7}}$$

command

```
integrate((a+a*sin(f*x+e))**3*(A+B*sin(f*x+e))/(c-c*sin(f*x+e))**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.5 Problem number 80

$$\int \frac{A+B\sin(e+fx)}{(a+a\sin(e+fx))^3(c-c\sin(e+fx))^6}\,dx$$

Optimal antiderivative

$$\frac{(A+B)\left(\sec^5(fx+e)\right)}{11a^3f\left(c^2-c^2\sin(fx+e)\right)^3}+\frac{(8A-3B)\left(\sec^5(fx+e)\right)}{99a^3f\left(c^3-c^3\sin(fx+e)\right)^2}+\frac{(8A-3B)\left(\sec^5(fx+e)\right)}{99a^3f\left(c^6-c^6\sin(fx+e)\right)}+\frac{2(8A-3B)\tan(fx+e)}{33a^3c^6f}+\frac{4(8A-3B)\left(\tan^3(fx+e)\right)}{99a^3c^6f}+\frac{2(8A-3B)\left(\tan^5(fx+e)\right)}{165a^3c^6f}$$

command

```
integrate((A+B*sin(f*x+e))/(a+a*sin(f*x+e))**3/(c-c*sin(f*x+e))**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.6 Problem number 218

$$\int (a+a\sin(e+fx))^3(c-c\sin(e+fx))^n(B(3-n)-B(4+n)\sin(e+fx))\,dx$$

Optimal antiderivative

$$\frac{a^3B\,c^3\left(\cos^7(fx+e)\right)(c-c\sin(fx+e))^{-3+n}}{f}$$

command

```
integrate((a+a*sin(f*x+e))**3*(c-c*sin(f*x+e))**n*(B*(3-n)-B*(4+n)*sin(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.7 Problem number 219

$$\int (a-a\sin(e+fx))^3(c+c\sin(e+fx))^n(B(3-n)+B(4+n)\sin(e+fx))\,dx$$

Optimal antiderivative

$$-\frac{a^3B\,c^3\left(\cos^7\left(fx+e\right)\right)\left(c+c\sin\left(fx+e\right)\right)^{-3+n}}{f}$$

command

`integrate((a-a*sin(f*x+e))**3*(c+c*sin(f*x+e))**n*(B*(3-n)+B*(4+n)*sin(f*x+e)),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.8 Problem number 220

$$\int (a+a\sin(e+fx))^m(c-c\sin(e+fx))^3(B(-3+m)-B(4+m)\sin(e+fx))\,dx$$

Optimal antiderivative

$$\frac{a^3B\,c^3\left(\cos^7\left(fx+e\right)\right)\left(a+a\sin\left(fx+e\right)\right)^{-3+m}}{f}$$

command

`integrate((a+a*sin(f*x+e))**m*(c-c*sin(f*x+e))**3*(B*(-3+m)-B*(4+m)*sin(f*x+e)),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.9 Problem number 221

$$\int (a - a\sin(e + fx))^m (c + c\sin(e + fx))^3 (B(-3 + m) + B(4 + m)\sin(e + fx))\,dx$$

Optimal antiderivative

$$-\frac{a^3 B\,c^3 \left(\cos^7\left(fx + e\right)\right)\left(a - a\sin\left(fx + e\right)\right)^{-3+m}}{f}$$

command

`integrate((a-a*sin(f*x+e))**m*(c+c*sin(f*x+e))**3*(B*(-3+m)+B*(4+m)*sin(f*x+e)),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.10 Problem number 248

$$\int \frac{(a + a\sin(e + fx))(A + B\sin(e + fx))}{c + d\sin(e + fx)}\,dx$$

Optimal antiderivative

$$-\frac{a(Bc - (A + B)\,d)\,x}{d^2} - \frac{aB\cos\left(fx + e\right)}{df} + \frac{2a(c - d)\left(-Ad + Bc\right)\arctan\left(\frac{d + c\tan\left(\frac{fx}{2} + \frac{e}{2}\right)}{\sqrt{c^2 - d^2}}\right)}{d^2 f\sqrt{c^2 - d^2}}$$

command

`integrate((a+a*sin(f*x+e))*(A+B*sin(f*x+e))/(c+d*sin(f*x+e)),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.11 Problem number 265

$$\int \frac{(A+B\sin(e+fx))(c+d\sin(e+fx))^3}{a+a\sin(e+fx)}\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{(3Ad(2c^2-2cd+d^2)+B(2c^3-6c^2d+9cd^2-3d^3))\,x}{2a}\\&+\frac{2d(3A(c^2-3cd+d^2)-B(7c^2-9cd+4d^2))\cos(fx+e)}{3af}\\&+\frac{d^2(6Ac-9Ad-11Bc+9Bd)\cos(fx+e)\sin(fx+e)}{6af}\\&+\frac{(3A-4B)\,d\cos(fx+e)\,(c+d\sin(fx+e))^2}{3af}-\frac{(A-B)\cos(fx+e)\,(c+d\sin(fx+e))^3}{f\,(a+a\sin(fx+e))}\end{aligned}$$

command

```
integrate((A+B*sin(f*x+e))*(c+d*sin(f*x+e))**3/(a+a*sin(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

49.12 Problem number 272

$$\int \frac{(A+B\sin(e+fx))(c+d\sin(e+fx))^3}{(a+a\sin(e+fx))^2}\,dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{d(2A(3c-2d)\,d+B(6c^2-12cd+7d^2))\,x}{2a^2}\\&+\frac{2d(A(c^2+6cd-5d^2)+B(2c^2-15cd+8d^2))\cos(fx+e)}{3a^2f}\\&+\frac{d^2(B(4c-21d)+2A(c+6d))\cos(fx+e)\sin(fx+e)}{6a^2f}\\&-\frac{(2B(c-4d)+A(c+5d))\cos(fx+e)\,(c+d\sin(fx+e))^2}{3a^2f\,(1+\sin(fx+e))}\\&-\frac{(A-B)\cos(fx+e)\,(c+d\sin(fx+e))^3}{3f\,(a+a\sin(fx+e))^2}\end{aligned}$$

command

```
integrate((A+B*sin(f*x+e))*(c+d*sin(f*x+e))**3/(a+a*sin(f*x+e))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

50 Test file number 79

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/79_4.1.7-d_trig-^m-a+b-c_sin-^n-^p`

50.1 Problem number 81

$$\int \frac{\sin(c+dx)}{a+b\sin^2(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{\operatorname{arctanh}\left(\frac{\cos(dx+c)\sqrt{b}}{\sqrt{a+b}}\right)}{d\sqrt{b}\,\sqrt{a+b}}$$

command

```
integrate(sin(d*x+c)/(a+b*sin(d*x+c)**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

50.2 Problem number 89

$$\int \frac{1}{a+b\sin^2(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{\sqrt{a+b}\,\tan(dx+c)}{\sqrt{a}}\right)}{d\sqrt{a}\,\sqrt{a+b}}$$

command

```
integrate(1/(a+b*sin(d*x+c)**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

50.3 Problem number 396

$$\int \frac{\cos(c+dx)}{\left(a+b\sin^3(c+dx)\right)^2}\,dx$$

Optimal antiderivative

$$\frac{2\ln\left(a^{\frac{1}{3}}+b^{\frac{1}{3}}\sin\left(dx+c\right)\right)}{9a^{\frac{5}{3}}b^{\frac{1}{3}}d}-\frac{\ln\left(a^{\frac{2}{3}}-a^{\frac{1}{3}}b^{\frac{1}{3}}\sin\left(dx+c\right)+b^{\frac{2}{3}}\left(\sin^2\left(dx+c\right)\right)\right)}{9a^{\frac{5}{3}}b^{\frac{1}{3}}d}+\frac{\sin\left(dx+c\right)}{3ad\left(a+b\left(\sin^3\left(dx+c\right)\right)\right)}-\frac{2\arctan\left(\frac{\left(a^{\frac{1}{3}}-2b^{\frac{1}{3}}\sin(dx+c)\right)\sqrt{3}}{3a^{\frac{1}{3}}}\right)\sqrt{3}}{9a^{\frac{5}{3}}b^{\frac{1}{3}}d}$$

command

```
integrate(cos(d*x+c)/(a+b*sin(d*x+c)**3)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty} x \cos(c)}{\sin^6(c)} \\ -\frac{1}{5b^2 d \sin^5(c+dx)} \\ \frac{\tilde{\infty} \sin(c+dx)}{d} \\ \frac{x\cos(c)}{(a+b\sin^3(c))^2} \\ \frac{\sin(c+dx)}{a^2 d} \\ -\frac{2a\sqrt[3]{-\frac{a}{b}}\log\left(-\sqrt[3]{-\frac{a}{b}}+\sin(c+dx)\right)}{9a^3d+9a^2bd\sin^3(c+dx)} + \frac{a\sqrt[3]{-\frac{a}{b}}\log\left(4\left(-\frac{a}{b}\right)^{\frac{2}{3}}+4\sqrt[3]{-\frac{a}{b}}\sin(c+dx)+4\sin^2(c+dx)\right)}{9a^3d+9a^2bd\sin^3(c+dx)} + \frac{2\sqrt{3}a\sqrt[3]{-\frac{a}{b}}\operatorname{atan}\left(\frac{\sqrt{3}}{3}+\right.}{9a^3d+9a^2bd\sin^3(} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

51 Test file number 82

Test folder name:

`test_cases/4_Trig_functions/4.2_Cosine/82_4.2.0-a_cos-^m-b_trg-^n`

51.1 Problem number 142

$$\int \cos^{\frac{3}{2}}(c+dx)\sqrt{b\cos(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{x\sqrt{b\cos(dx+c)}}{2\sqrt{\cos(dx+c)}} + \frac{\sin(dx+c)\left(\sqrt{\cos}(dx+c)\right)\sqrt{b\cos(dx+c)}}{2d}$$

command

`integrate(cos(d*x+c)**(3/2)*(b*cos(d*x+c))**(1/2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} 0 & \text{for } c = - \\ x\sqrt{b\cos(c)}\cos^{\frac{3}{2}}(c) & \text{for } d = 0 \\ \frac{x\sqrt{b\cos(c+dx)}\sin^2(c+dx)}{2\sqrt{\cos(c+dx)}} + \frac{x\sqrt{b\cos(c+dx)}\cos^{\frac{3}{2}}(c+dx)}{2} + \frac{\sqrt{b\cos(c+dx)}\sin(c+dx)\sqrt{\cos(c+dx)}}{2d} & \text{otherwis} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

51.2 Problem number 153

$$\int \frac{(b\cos(c+dx))^{3/2}}{\sqrt{\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{b\sin(dx+c)\sqrt{b\cos(dx+c)}}{d\sqrt{\cos(dx+c)}}$$

command

```
integrate((b*cos(d*x+c))**(3/2)/cos(d*x+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{(b\cos(c+dx))^{\frac{3}{2}}\sin(c+dx)}{d\cos^{\frac{3}{2}}(c+dx)} & \text{for } d\neq 0 \\ \frac{x(b\cos(c))^{\frac{3}{2}}}{\sqrt{\cos(c)}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

51.3 Problem number 175

$$\int \frac{\cos^{\frac{3}{2}}(c+dx)}{\sqrt{b\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{\sin(dx+c)\left(\sqrt{\cos}\,(dx+c)\right)}{d\sqrt{b\cos(dx+c)}}$$

command

```
integrate(cos(d*x+c)**(3/2)/(b*cos(d*x+c))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\sin(c+dx)\sqrt{\cos(c+dx)}}{d\sqrt{b\cos(c+dx)}} & \text{for } d\neq 0 \\ \frac{x\cos^{\frac{3}{2}}(c)}{\sqrt{b\cos(c)}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

52 Test file number 86

Test folder name:

`test_cases/4_Trig_functions/4.2_Cosine/86_4.2.1.2-g_sin-^p-a+b_cos-^m`

52.1 Problem number 25

$$\int \frac{\sin^3(x)}{a+b\cos(x)}\,dx$$

Optimal antiderivative

$$-\frac{a\cos(x)}{b^2}+\frac{\cos^2(x)}{2b}+\frac{(a^2-b^2)\ln(a+b\cos(x))}{b^3}$$

command

```
integrate(sin(x)**3/(a+b*cos(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

53 Test file number 89

Test folder name:

`test_cases/4_Trig_functions/4.2_Cosine/89_4.2.2.1-a+b_cos-^m-c+d_cos-^n`

53.1 Problem number 792

$$\int \frac{a+b\cos(c+dx)}{(b+a\cos(c+dx))^2}\,dx$$

Optimal antiderivative

$$\frac{\sin(dx+c)}{d(b+a\cos(dx+c))}$$

command

```
integrate((a+b*cos(d*x+c))/(b+a*cos(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2\tan\left(\frac{c}{2}+\frac{dx}{2}\right)}{ad\tan^2\left(\frac{c}{2}+\frac{dx}{2}\right)-ad-bd\tan^2\left(\frac{c}{2}+\frac{dx}{2}\right)-bd} & \text{for } d \neq 0 \\ \frac{x(a+b\cos(c))}{(a\cos(c)+b)^2} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

53.2 Problem number 852

$$\int \frac{(b\cos(c+dx))^{3/2}(A+B\cos(c+dx))}{\sqrt{\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{bBx\sqrt{b\cos(dx+c)}}{2\sqrt{\cos(dx+c)}}+\frac{Ab\sin(dx+c)\sqrt{b\cos(dx+c)}}{d\sqrt{\cos(dx+c)}}+\frac{bB\sin(dx+c)\left(\sqrt{\cos}\,(dx+c)\right)\sqrt{b\cos(dx+c)}}{2d}$$

command

```
integrate((b*cos(d*x+c))**(3/2)*(A+B*cos(d*x+c))/cos(d*x+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{A(b\cos(c+dx))^{\frac{3}{2}}\sin(c+dx)}{d\cos^{\frac{3}{2}}(c+dx)}+\frac{Bx(b\cos(c+dx))^{\frac{3}{2}}\sin^2(c+dx)}{2\cos^{\frac{3}{2}}(c+dx)}+\frac{Bx(b\cos(c+dx))^{\frac{3}{2}}\sqrt{\cos(c+dx)}}{2}+\frac{B(b\cos(c+dx))^{\frac{3}{2}}\sin(c+dx)}{2d\sqrt{\cos(c+dx)}} & \text{fo} \\ \frac{x(b\cos(c))^{\frac{3}{2}}(A+B\cos(c))}{\sqrt{\cos(c)}} & \text{ot} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

53.3 Problem number 853

$$\int \frac{(b\cos(c+dx))^{3/2}(A+B\cos(c+dx))}{\cos^{\frac{3}{2}}(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{Abx\sqrt{b\cos(dx+c)}}{\sqrt{\cos(dx+c)}}+\frac{bB\sin(dx+c)\sqrt{b\cos(dx+c)}}{d\sqrt{\cos(dx+c)}}$$

command

```
integrate((b*cos(d*x+c))**(3/2)*(A+B*cos(d*x+c))/cos(d*x+c)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{Ax(b\cos{(c+dx)})^{\frac{3}{2}}}{\cos^{\frac{3}{2}}{(c+dx)}} + \frac{B(b\cos{(c+dx)})^{\frac{3}{2}}\sin{(c+dx)}}{d\cos^{\frac{3}{2}}{(c+dx)}} & \text{for } d \neq 0 \\ \frac{x(b\cos{(c)})^{\frac{3}{2}}(A+B\cos{(c)})}{\cos^{\frac{3}{2}}{(c)}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

53.4 Problem number 867

$$\int \frac{\cos^{\frac{3}{2}}(c+dx)(A+B\cos(c+dx))}{\sqrt{b\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{B\left(\cos^{\frac{3}{2}}{(dx+c)}\right)\sin{(dx+c)}}{2d\sqrt{b\cos{(dx+c)}}} + \frac{Bx\left(\sqrt{\cos}\,(dx+c)\right)}{2\sqrt{b\cos{(dx+c)}}} + \frac{A\sin{(dx+c)}\left(\sqrt{\cos}\,(dx+c)\right)}{d\sqrt{b\cos{(dx+c)}}}$$

command

```
integrate(cos(d*x+c)**(3/2)*(A+B*cos(d*x+c))/(b*cos(d*x+c))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{A\sin{(c+dx)}\sqrt{\cos{(c+dx)}}}{d\sqrt{b\cos{(c+dx)}}} + \frac{Bx\sin^{2}{(c+dx)}\sqrt{\cos{(c+dx)}}}{2\sqrt{b\cos{(c+dx)}}} + \frac{Bx\cos^{\frac{5}{2}}{(c+dx)}}{2\sqrt{b\cos{(c+dx)}}} + \frac{B\sin{(c+dx)}\cos^{\frac{3}{2}}{(c+dx)}}{2d\sqrt{b\cos{(c+dx)}}} & \text{for } d \neq 0 \\ \frac{x(A+B\cos{(c)})\cos^{\frac{3}{2}}{(c)}}{\sqrt{b\cos{(c)}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

53.5 Problem number 875

$$\int \frac{\cos^{\frac{3}{2}}(c+dx)(A+B\cos(c+dx))}{(b\cos(c+dx))^{3/2}}\,dx$$

Optimal antiderivative

$$\frac{Ax\left(\sqrt{\cos}\,(dx+c)\right)}{b\sqrt{b\cos(dx+c)}}+\frac{B\sin(dx+c)\left(\sqrt{\cos}\,(dx+c)\right)}{bd\sqrt{b\cos(dx+c)}}$$

command

```
integrate(cos(d*x+c)**(3/2)*(A+B*cos(d*x+c))/(b*cos(d*x+c))**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{Ax\cos^{\frac{3}{2}}(c+dx)}{(b\cos(c+dx))^{\frac{3}{2}}}+\frac{B\sin(c+dx)\cos^{\frac{3}{2}}(c+dx)}{d(b\cos(c+dx))^{\frac{3}{2}}} & \text{for } d\neq 0 \\ \frac{x(A+B\cos(c))\cos^{\frac{3}{2}}(c)}{(b\cos(c))^{\frac{3}{2}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

54 Test file number 92

Test folder name:

`test_cases/4_Trig_functions/4.2_Cosine/92_4.2.3.1-a+b_cos-^m-c+d_cos-^n-A+B_cos-`

54.1 Problem number 292

$$\int \frac{aB+bB\cos(c+dx)}{(a+b\cos(c+dx))^2}\,dx$$

Optimal antiderivative

$$\frac{2B\arctan\left(\frac{\sqrt{a-b}\,\tan\left(\frac{dx}{2}+\frac{c}{2}\right)}{\sqrt{a+b}}\right)}{d\sqrt{a-b}\,\sqrt{a+b}}$$

command

```
integrate((a*B+b*B*cos(d*x+c))/(a+b*cos(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty} Bx}{\cos(c)} & \text{for } a = 0 \wedge b = 0 \wedge d = 0 \\ \frac{B \tan\left(\frac{c}{2} + \frac{dx}{2}\right)}{bd} & \text{for } a = b \\ \frac{B}{bd \tan\left(\frac{c}{2} + \frac{dx}{2}\right)} & \text{for } a = -b \\ \frac{x(Ba + Bb\cos(c))}{(a + b\cos(c))^2} & \text{for } d = 0 \\ \frac{B \log\left(-\sqrt{-\frac{a}{a-b} - \frac{b}{a-b}} + \tan\left(\frac{c}{2} + \frac{dx}{2}\right)\right)}{ad\sqrt{-\frac{a}{a-b} - \frac{b}{a-b}} - bd\sqrt{-\frac{a}{a-b} - \frac{b}{a-b}}} - \frac{B \log\left(\sqrt{-\frac{a}{a-b} - \frac{b}{a-b}} + \tan\left(\frac{c}{2} + \frac{dx}{2}\right)\right)}{ad\sqrt{-\frac{a}{a-b} - \frac{b}{a-b}} - bd\sqrt{-\frac{a}{a-b} - \frac{b}{a-b}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

55 Test file number 93

Test folder name:

`test_cases/4_Trig_functions/4.2_Cosine/93_4.2.4.1-a+b_cos-^m-A+B_cos+C_cos^2-`

55.1 Problem number 91

$$\int \sqrt{\cos(c+dx)}\,\sqrt{b\cos(c+dx)}\,\left(A + C\cos^2(c+dx)\right)\,dx$$

Optimal antiderivative

$$\frac{(A+C)\sin(dx+c)\sqrt{b\cos(dx+c)}}{d\sqrt{\cos(dx+c)}} - \frac{C\left(\sin^3(dx+c)\right)\sqrt{b\cos(dx+c)}}{3d\sqrt{\cos(dx+c)}}$$

command

```
integrate((A+C*cos(d*x+c)**2)*cos(d*x+c)**(1/2)*(b*cos(d*x+c))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} 0 & \text{for } c = -dx \\ x\sqrt{b\cos(c)}\left(A + C\cos^2(c)\right)\sqrt{\cos(c)} & \text{for } d = 0 \\ \frac{A\sqrt{b\cos(c+dx)}\sin(c+dx)}{d\sqrt{\cos(c+dx)}} + \frac{2C\sqrt{b\cos(c+dx)}\sin^3(c+dx)}{3d\sqrt{\cos(c+dx)}} + \frac{C\sqrt{b\cos(c+dx)}\sin(c+dx)\cos^{\frac{3}{2}}(c+dx)}{d} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

55.2 Problem number 92

$$\int \frac{\sqrt{b\cos(c+dx)}\,(A+C\cos^2(c+dx))}{\sqrt{\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{Ax\sqrt{b\cos(dx+c)}}{\sqrt{\cos(dx+c)}}+\frac{Cx\sqrt{b\cos(dx+c)}}{2\sqrt{\cos(dx+c)}}+\frac{C\sin(dx+c)\left(\sqrt{\cos}\,(dx+c)\right)\sqrt{b\cos(dx+c)}}{2d}$$

command

```
integrate((A+C*cos(d*x+c)**2)*(b*cos(d*x+c))**(1/2)/cos(d*x+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{Ax\sqrt{b\cos(c+dx)}}{\sqrt{\cos(c+dx)}}+\frac{Cx\sqrt{b\cos(c+dx)}\sin^2(c+dx)}{2\sqrt{\cos(c+dx)}}+\frac{Cx\sqrt{b\cos(c+dx)}\cos^{\frac{3}{2}}(c+dx)}{2}+\frac{C\sqrt{b\cos(c+dx)}\sin(c+dx)}{2d} \\ \frac{x\sqrt{b\cos(c)}\,(A+C\cos^2(c))}{\sqrt{\cos(c)}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

55.3 Problem number 118

$$\int \frac{\sqrt{\cos(c+dx)}\,(A+C\cos^2(c+dx))}{\sqrt{b\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{C\left(\cos^{\frac{3}{2}}(dx+c)\right)\sin(dx+c)}{2d\sqrt{b\cos(dx+c)}}+\frac{Ax\left(\sqrt{\cos}\,(dx+c)\right)}{\sqrt{b\cos(dx+c)}}+\frac{Cx\left(\sqrt{\cos}\,(dx+c)\right)}{2\sqrt{b\cos(dx+c)}}$$

command

```
integrate((A+C*cos(d*x+c)**2)*cos(d*x+c)**(1/2)/(b*cos(d*x+c))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{Ax\sqrt{\cos(c+dx)}}{\sqrt{b\cos(c+dx)}}+\frac{Cx\sin^2(c+dx)\sqrt{\cos(c+dx)}}{2\sqrt{b\cos(c+dx)}}+\frac{Cx\cos^{\frac{5}{2}}(c+dx)}{2\sqrt{b\cos(c+dx)}}+\frac{C\sin(c+dx)\cos^{\frac{3}{2}}(c+dx)}{2d\sqrt{b\cos(c+dx)}} & \text{for } d\neq 0 \\ \frac{x(A+C\cos^2(c))\sqrt{\cos(c)}}{\sqrt{b\cos(c)}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

55.4 Problem number 290

$$\int \sqrt{\cos(c+dx)}\,\sqrt{b\cos(c+dx)}\,\left(A+B\cos(c+dx)+C\cos^2(c+dx)\right)\,dx$$

Optimal antiderivative

$$\frac{C\left(\cos^{\frac{3}{2}}(dx+c)\right)\sin(dx+c)\sqrt{b\cos(dx+c)}}{3d}+\frac{Bx\sqrt{b\cos(dx+c)}}{2\sqrt{\cos(dx+c)}}+\frac{(3A+2C)\sin(dx+c)\sqrt{b\cos(dx+c)}}{3d\sqrt{\cos(dx+c)}}+\frac{B\sin(dx+c)\left(\sqrt{\cos}\,(dx+c)\right)\sqrt{b\cos(dx+c)}}{2d}$$

command

```
integrate((A+B*cos(d*x+c)+C*cos(d*x+c)**2)*cos(d*x+c)**(1/2)*(b*cos(d*x+c))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} 0 \\ x\sqrt{b\cos(c)}\left(A+B\cos(c)+C\cos^2(c)\right)\sqrt{\cos(c)} \\ \frac{A\sqrt{b\cos(c+dx)}\sin(c+dx)}{d\sqrt{\cos(c+dx)}}+\frac{Bx\sqrt{b\cos(c+dx)}\sin^2(c+dx)}{2\sqrt{\cos(c+dx)}}+\frac{Bx\sqrt{b\cos(c+dx)}\cos^{\frac{3}{2}}(c+dx)}{2}+\frac{B\sqrt{b\cos(c+dx)}\ldots}{\ldots} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

55.5 Problem number 291

$$\int \frac{\sqrt{b\cos(c+dx)}\,\left(A+B\cos(c+dx)+C\cos^2(c+dx)\right)}{\sqrt{\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{Ax\sqrt{b\cos(dx+c)}}{\sqrt{\cos(dx+c)}}+\frac{Cx\sqrt{b\cos(dx+c)}}{2\sqrt{\cos(dx+c)}}+\frac{B\sin(dx+c)\sqrt{b\cos(dx+c)}}{d\sqrt{\cos(dx+c)}}+\frac{C\sin(dx+c)\left(\sqrt{\cos}\,(dx+c)\right)\sqrt{b\cos(dx+c)}}{2d}$$

command

```
integrate((A+B*cos(d*x+c)+C*cos(d*x+c)**2)*(b*cos(d*x+c))**(1/2)/cos(d*x+c)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{Ax\sqrt{b\cos(c+dx)}}{\sqrt{\cos(c+dx)}} + \frac{B\sqrt{b\cos(c+dx)}\sin(c+dx)}{d\sqrt{\cos(c+dx)}} + \frac{Cx\sqrt{b\cos(c+dx)}\sin^2(c+dx)}{2\sqrt{\cos(c+dx)}} + \frac{Cx\sqrt{b\cos(c+dx)}\cos^{\frac{3}{2}}(c+dx)}{2} \\ \frac{x\sqrt{b\cos(c)}(A+B\cos(c)+C\cos^2(c))}{\sqrt{\cos(c)}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

55.6 Problem number 317

$$\int \frac{\sqrt{\cos(c+dx)}\,(A+B\cos(c+dx)+C\cos^2(c+dx))}{\sqrt{b\cos(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{C\left(\cos^{\frac{3}{2}}(dx+c)\right)\sin(dx+c)}{2d\sqrt{b\cos(dx+c)}} + \frac{Ax\left(\sqrt{\cos}(dx+c)\right)}{\sqrt{b\cos(dx+c)}} + \frac{Cx\left(\sqrt{\cos}(dx+c)\right)}{2\sqrt{b\cos(dx+c)}} + \frac{B\sin(dx+c)\left(\sqrt{\cos}(dx+c)\right)}{d\sqrt{b\cos(dx+c)}}$$

command

```
integrate((A+B*cos(d*x+c)+C*cos(d*x+c)**2)*cos(d*x+c)**(1/2)/(b*cos(d*x+c))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{Ax\sqrt{\cos(c+dx)}}{\sqrt{b\cos(c+dx)}} + \frac{B\sin(c+dx)\sqrt{\cos(c+dx)}}{d\sqrt{b\cos(c+dx)}} + \frac{Cx\sin^2(c+dx)\sqrt{\cos(c+dx)}}{2\sqrt{b\cos(c+dx)}} + \frac{Cx\cos^{\frac{5}{2}}(c+dx)}{2\sqrt{b\cos(c+dx)}} + \frac{C\sin(c+dx)\cos}{2d\sqrt{b\cos(c}} \\ \frac{x(A+B\cos(c)+C\cos^2(c))\sqrt{\cos(c)}}{\sqrt{b\cos(c)}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

56 Test file number 94

Test folder name:

`test_cases/4_Trig_functions/4.2_Cosine/94_4.2.4.2-a+b_cos-^m-c+d_cos-^n-A+B_cos+C_cos^2-`

56.1 Problem number 595

$$\int \frac{\cos(c+dx)\left(1-\cos^2(c+dx)\right)}{a+b\cos(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{(2a^2-b^2)\,x}{2b^3}+\frac{a\sin(dx+c)}{b^2d}-\frac{\cos(dx+c)\sin(dx+c)}{2bd}+\frac{2a\arctan\left(\frac{\sqrt{a-b}\,\tan\left(\frac{dx}{2}+\frac{c}{2}\right)}{\sqrt{a+b}}\right)\sqrt{a-b}\,\sqrt{a+b}}{b^3d}$$

command

```
integrate(cos(d*x+c)*(1-cos(d*x+c)**2)/(a+b*cos(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

57 Test file number 95

Test folder name:

`test_cases/4_Trig_functions/4.2_Cosine/95_4.2.7-d_trig-^m-a+b-c_cos-^n-^p`

57.1 Problem number 31

$$\int \frac{\cos(x)}{a+b\cos^2(x)}\,dx$$

Optimal antiderivative

$$\frac{\operatorname{arctanh}\left(\frac{\sin(x)\sqrt{b}}{\sqrt{a+b}}\right)}{\sqrt{b}\,\sqrt{a+b}}$$

command

```
integrate(cos(x)/(a+b*cos(x)**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

58 Test file number 98

Test folder name:

```
test_cases/4_Trig_functions/4.3_Tangent/98_4.3.0-a_trg-^m-b_tan-^n
```

58.1 Problem number 304

$$\int \frac{(b\tan(e+fx))^{3/2}}{(d\sec(e+fx))^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{2(b\tan(fx+e))^{\frac{5}{2}}}{5bf\,(d\sec(fx+e))^{\frac{5}{2}}}$$

command

```
integrate((b*tan(f*x+e))**(3/2)/(d*sec(f*x+e))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2(b\tan(e+fx))^{\frac{3}{2}}\tan(e+fx)}{5f(d\sec(e+fx))^{\frac{5}{2}}} & \text{for}\ f\neq 0 \\ \frac{x(b\tan(e))^{\frac{3}{2}}}{(d\sec(e))^{\frac{5}{2}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

58.2 Problem number 321

$$\int \frac{1}{(d\sec(e+fx))^{5/2}\sqrt{b\tan(e+fx)}}\,dx$$

Optimal antiderivative

$$\frac{2\sqrt{b\tan(fx+e)}}{5bf\,(d\sec(fx+e))^{\frac{5}{2}}}+\frac{8\sqrt{b\tan(fx+e)}}{5b\,d^{2}f\sqrt{d\sec(fx+e)}}$$

command

```
integrate(1/(d*sec(f*x+e))**(5/2)/(b*tan(f*x+e))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{8\tan^{3}(e+fx)}{5f\sqrt{b\tan(e+fx)}\,(d\sec(e+fx))^{\frac{5}{2}}}+\frac{2\tan(e+fx)}{f\sqrt{b\tan(e+fx)}\,(d\sec(e+fx))^{\frac{5}{2}}} & \text{for } f\neq 0\\ \frac{x}{\sqrt{b\tan(e)}\,(d\sec(e))^{\frac{5}{2}}} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

58.3 Problem number 326

$$\int \frac{1}{(d\sec(e+fx))^{3/2}(b\tan(e+fx))^{3/2}}\,dx$$

Optimal antiderivative

$$\frac{2}{3bf\,(d\sec(fx+e))^{\frac{3}{2}}\sqrt{b\tan(fx+e)}}-\frac{8\sqrt{d\sec(fx+e)}}{3b\,d^{2}f\sqrt{b\tan(fx+e)}}$$

command

```
integrate(1/(d*sec(f*x+e))**(3/2)/(b*tan(f*x+e))**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{8\tan^{3}(e+fx)}{3f(b\tan(e+fx))^{\frac{3}{2}}(d\sec(e+fx))^{\frac{3}{2}}}-\frac{2\tan(e+fx)}{f(b\tan(e+fx))^{\frac{3}{2}}(d\sec(e+fx))^{\frac{3}{2}}} & \text{for } f\neq 0\\ \frac{x}{(b\tan(e))^{\frac{3}{2}}(d\sec(e))^{\frac{3}{2}}} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

58.4 Problem number 330

$$\int \frac{(d\sec(e+fx))^{3/2}}{(b\tan(e+fx))^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2(d\sec(fx+e))^{\frac{3}{2}}}{3bf\,(b\tan(fx+e))^{\frac{3}{2}}}$$

command

```
integrate((d*sec(f*x+e))**(3/2)/(b*tan(f*x+e))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2(d\sec(e+fx))^{\frac{3}{2}}\tan(e+fx)}{3f(b\tan(e+fx))^{\frac{5}{2}}} & \text{for } f\neq 0\\ \frac{x(d\sec(e))^{\frac{3}{2}}}{(b\tan(e))^{\frac{5}{2}}} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

58.5 Problem number 332

$$\int \frac{1}{\sqrt{d\sec(e+fx)}\,(b\tan(e+fx))^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{8\sqrt{b\tan(fx+e)}}{3b^3f\sqrt{d\sec(fx+e)}}-\frac{2}{3bf\sqrt{d\sec(fx+e)}\,\left(b\tan(fx+e)\right)^{\frac{3}{2}}}$$

command

```
integrate(1/(d*sec(f*x+e))**(1/2)/(b*tan(f*x+e))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{8\tan^3(e+fx)}{3f(b\tan(e+fx))^{\frac{5}{2}}\sqrt{d\sec(e+fx)}}-\frac{2\tan(e+fx)}{3f(b\tan(e+fx))^{\frac{5}{2}}\sqrt{d\sec(e+fx)}} & \text{for } f\neq 0\\ \frac{x}{(b\tan(e))^{\frac{5}{2}}\sqrt{d\sec(e)}} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

59 Test file number 101

Test folder name:

`test_cases/4_Trig_functions/4.3_Tangent/101_4.3.1.2-d_sec-^m-a+b_tan-^n`

59.1 Problem number 486

$$\int (e\sec(c+dx))^{-1-n}(a+ia\tan(c+dx))^n\,dx$$

Optimal antiderivative

$$\frac{i(e\sec(dx+c))^{-1-n}(a+ia\tan(dx+c))^n}{d(1-n)}-\frac{i(e\sec(dx+c))^{-1-n}(a+ia\tan(dx+c))^{1+n}}{ad(-n^2+1)}$$

command

```
integrate((e*sec(d*x+c))**(-1-n)*(a+I*a*tan(d*x+c))**n,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\begin{cases}\frac{x(e\sec(c))^{-n}(ia\tan(c)+a)^n}{\sec(c)} & \text{for } d=0\\ \frac{dex\tan(c+dx)}{2ad\tan(c+dx)-2iad}-\frac{idex}{2ad\tan(c+dx)-2iad}+\frac{e}{2ad\tan(c+dx)-2iad} & \text{for } n=-1\\ \frac{ax\tan^2(c+dx)}{2e\sec^2(c+dx)}+\frac{ax}{2e\sec^2(c+dx)}+\frac{a\tan(c+dx)}{2de\sec^2(c+dx)}-\frac{ia}{2de\sec^2(c+dx)} & \text{for } n=1\\ -\frac{in(ia\tan(c+dx)+a)^n}{dn^2(e\sec(c+dx))^n\sec(c+dx)-d(e\sec(c+dx))^n\sec(c+dx)}-\frac{(ia\tan(c+dx)+a)^n\tan(c+dx)}{dn^2(e\sec(c+dx))^n\sec(c+dx)-d(e\sec(c+dx))^n\sec(c+dx)} & \text{otherwise}\end{cases}}{e}$$

Sympy 1.8 under Python 3.8.8 output

$$\int(e\sec(c+dx))^{-n-1}(ia(\tan(c+dx)-i))^n\,dx$$

59.2 Problem number 487

$$\int (e\sec(c+dx))^{-n}(a+ia\tan(c+dx))^n\,dx$$

Optimal antiderivative

$$-\frac{i(a+ia\tan(dx+c))^n(e\sec(dx+c))^{-n}}{dn}$$

command

`integrate((a+I*a*tan(d*x+c))**n/((e*sec(d*x+c))**n),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} x & \text{for } n = 0 \wedge (d = 0 \vee n = 0) \\ x(e\sec(c))^{-n}(ia\tan(c) + a)^n & \text{for } d = 0 \\ -\frac{i(e\sec(c+dx))^{-n}(ia\tan(c+dx)+a)^n}{dn} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} x & \text{for } n = 0 \\ x(e\sec(c))^{-n}(ia\tan(c) + a)^n & \text{for } d = 0 \\ \int \left(0^{\frac{1}{n}}\sec(c+dx)\right)^{-n}(ia(\tan(c+dx) - i))^n\, dx & \text{for } e = 0^{\frac{1}{n}} \\ -\frac{ie^{-n}(ia\tan(c+dx)+a)^n\sec^{-n}(c+dx)}{dn} & \text{otherwise} \end{cases}$$

60 Test file number 103

Test folder name:

`test_cases/4_Trig_functions/4.3_Tangent/103_4.3.2.1-a+b_tan-^m-c+d_tan-^n`

60.1 Problem number 28

$$\int \cot(c+dx)(a+ia\tan(c+dx))^3\,dx$$

Optimal antiderivative

$$4ia^3x + \frac{3a^3\ln(\cos(dx+c))}{d} + \frac{a^3\ln(\sin(dx+c))}{d} + \frac{-a^3 - ia^3\tan(dx+c)}{d}$$

command

`integrate(cot(d*x+c)*(a+I*a*tan(d*x+c))**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2a^3}{de^{2ic}e^{2idx} + d} + \frac{a^3\left(\log\left(e^{2idx} - e^{-2ic}\right) + 3\log\left(e^{2idx} + e^{-2ic}\right)\right)}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

60.2 Problem number 29

$$\int \cot^2(c+dx)(a+ia\tan(c+dx))^3\,dx$$

Optimal antiderivative

$$-4a^3x+\frac{ia^3\ln(\cos(dx+c))}{d}+\frac{3ia^3\ln(\sin(dx+c))}{d}-\frac{\cot(dx+c)\left(a^3+ia^3\tan(dx+c)\right)}{d}$$

command

```
integrate(cot(d*x+c)**2*(a+I*a*tan(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2ia^3}{de^{2ic}e^{2idx}-d}+\frac{a^3\cdot\left(3i\log\left(e^{2idx}-e^{-2ic}\right)+i\log\left(e^{2idx}+e^{-2ic}\right)\right)}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

60.3 Problem number 38

$$\int \cot(c+dx)(a+ia\tan(c+dx))^4\,dx$$

Optimal antiderivative

$$8ia^4x+\frac{7a^4\ln(\cos(dx+c))}{d}+\frac{a^4\ln(\sin(dx+c))}{d}-\frac{\left(a^2+ia^2\tan(dx+c)\right)^2}{2d}-\frac{3\left(a^4+ia^4\tan(dx+c)\right)}{d}$$

command

```
integrate(cot(d*x+c)*(a+I*a*tan(d*x+c))**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^4\left(\log\left(e^{2idx}-e^{-2ic}\right)+7\log\left(e^{2idx}+e^{-2ic}\right)\right)}{d}+\frac{10a^4e^{2ic}e^{2idx}+8a^4}{de^{4ic}e^{4idx}+2de^{2ic}e^{2idx}+d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

60.4 Problem number 40

$$\int \cot^3(c+dx)(a+ia\tan(c+dx))^4\,dx$$

Optimal antiderivative

$$-8ia^4x-\frac{a^4\ln(\cos(dx+c))}{d}-\frac{7a^4\ln(\sin(dx+c))}{d}-\frac{(\cot^2(dx+c))\,(a^2+ia^2\tan(dx+c))^2}{2d}-\frac{3i\cot(dx+c)\,(a^4+ia^4\tan(dx+c))}{d}$$

command

```
integrate(cot(d*x+c)**3*(a+I*a*tan(d*x+c))**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{a^4\left(-7\log\left(e^{2idx}-e^{-2ic}\right)-\log\left(e^{2idx}+e^{-2ic}\right)\right)}{d}+\frac{10a^4e^{2ic}e^{2idx}-8a^4}{de^{4ic}e^{4idx}-2de^{2ic}e^{2idx}+d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

60.5 Problem number 1094

$$\int \frac{1}{(a+ia\tan(e+fx))^3(c+d\tan(e+fx))^2}\,dx$$

Optimal antiderivative

$$\frac{(5ic^4d-10ic^2d^3+25id^5+c^5-10c^3d^2-35c\,d^4)\,x}{8a^3\,(-id+c)^2\,(id+c)^5}+\frac{(-3id+5c)\,d^4\ln(c\cos(fx+e)+d\sin(fx+e))}{a^3\,(ic-d)^5\,(-id+c)^2\,f}+\frac{d(5ic^2d+25id^3+c^3-11c\,d^2)}{8a^3\,(-id+c)\,(id+c)^4\,f\,(c+d\tan(fx+e))}-\frac{1}{6\,(ic-d)\,f\,(a+ia\tan(fx+e))^3\,(c+d\tan(fx+e))}+\frac{3ic-11d}{24a\,(id+c)^2\,f\,(a+ia\tan(fx+e))^2\,(c+d\tan(fx+e))}+\frac{5icd+c^2-12d^2}{8\,(ic-d)^3\,f\,(a^3+ia^3\tan(fx+e))\,(c+d\tan(fx+e))}$$

command

```
integrate(1/(a+I*a*tan(f*x+e))**3/(c+d*tan(f*x+e))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

60.6 Problem number 1099

$$\int \frac{1}{(a+ia\tan(e+fx))^2(c+d\tan(e+fx))^3}\,dx$$

Optimal antiderivative

$$\frac{(5ic^4d+30ic^2d^3-15id^5+c^5-10c^3d^2+45c\,d^4)\,x}{4a^2\,(-id+c)^3\,(id+c)^5} - \frac{2d^3\left(-5icd+5c^2-2d^2\right)\ln\left(c\cos\left(fx+e\right)+d\sin\left(fx+e\right)\right)}{a^2\,(ic-d)^5\,(ic+d)^3\,f} + \frac{d\left(5icd+c^2+8d^2\right)}{4a^2\,(-id+c)\,(id+c)^3\,f\,(c+d\tan\left(fx+e\right))^2} + \frac{ic-5d}{4a^2\,(id+c)^2\,f\,(1+i\tan\left(fx+e\right))\,(c+d\tan\left(fx+e\right))^2} - \frac{1}{4\,(ic-d)\,f\,(a+ia\tan\left(fx+e\right))^2\,(c+d\tan\left(fx+e\right))^2} + \frac{(-3id+c)\,d\left(8icd+c^2+5d^2\right)}{4a^2\,(-id+c)^2\,(id+c)^4\,f\,(c+d\tan\left(fx+e\right))}$$

command

```
integrate(1/(a+I*a*tan(f*x+e))**2/(c+d*tan(f*x+e))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{x\left(c^2+8icd-31d^2\right)}{4a^2c^5+20ia^2c^4d-40a^2c^3d^2-40ia^2c^2d^3+20a^2cd^4+4ia^2d^5}$$

$$+\frac{}{a^2c^9f+3ia^2c^8df+8ia^2c^6d^3f-6a^2c^5d^4f+6ia^2c^4d^5f-8a^2c^3d^6f-3a^2cd^8f-ia^2d^9f+\left(2a^2c^9fe^{2ie}+2ia^2c^8df\right.}$$

$$+\begin{cases}\frac{\left(4ia^2c^4fe^{2ie}-16a^2c^3dfe^{2ie}-24ia^2c^2d^2fe^{2ie}+16a^2cd^3fe^{2ie}+4ia^2d^4fe^{2ie}\right)e^{-4ifx}+\left(16ia^2c^4fe^{4ie}-112a^2c^3dfe^{4ie}-240ia^2c^2d^2fe^{4ie}+208a^2cd\right.}{64a^4c^7f^2e^{6ie}+448ia^4c^6df^2e^{6ie}-1344a^4c^5d^2f^2e^{6ie}-2240ia^4c^4d^3f^2e^{6ie}+2240a^4c^3d^4f^2e^{6ie}+1344ia^4c^2d^5f^2e^{6ie}-448a^4cd^6f^2e^{6ie}} \\ x\left(-\frac{c^2+8icd-31d^2}{4a^2c^5+20ia^2c^4d-40a^2c^3d^2-40ia^2c^2d^3+20a^2cd^4+4ia^2d^5}+\frac{c^2e^{4ie}+2c^2e^{2ie}+c^2+8icde^{4ie}+10icde^{2ie}+2icd-31d^2e^{4ie}-8d^2e^{2ie}-d}{4a^2c^5e^{4ie}+20ia^2c^4de^{4ie}-40a^2c^3d^2e^{4ie}-40ia^2c^2d^3e^{4ie}+20a^2cd^4e^{4ie}+4ia}\right.\end{cases}$$

$$-\frac{2d^3\cdot\left(5c^2-5icd-2d^2\right)\log\left(\frac{c+id}{ce^{2ie}-ide^{2ie}}+e^{2ifx}\right)}{a^2f\,(c-id)^3\,(c+id)^5}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

61 Test file number 104

Test folder name:

test_cases/4_Trig_functions/4.3_Tangent/104_4.3.3.1-a+b_tan-^m-c+d_tan-^n-A+B_tan-

61.1 Problem number 12

$$\int \cot(c+dx)(a+ia\tan(c+dx))^2(A+B\tan(c+dx))\,dx$$

Optimal antiderivative

$$2a^2(iA+B)\,x+\frac{a^2(-2iB+A)\ln(\cos(dx+c))}{d}+\frac{a^2A\ln(\sin(dx+c))}{d}+\frac{iB(a^2+ia^2\tan(dx+c))}{d}$$

command

integrate(cot(d*x+c)*(a+I*a*tan(d*x+c))2*(A+B*tan(d*x+c)),x)**

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{Aa^2\log\left(e^{2idx}-e^{-2ic}\right)}{d}-\frac{2iBa^2}{de^{2ic}e^{2idx}+d}+\frac{a^2(A-2iB)\log\left(e^{2idx}+\frac{(-iAa^2-Ba^2+ia^2(A-2iB))e^{-2ic}}{Ba^2}\right)}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

61.2 Problem number 13

$$\int \cot^2(c+dx)(a+ia\tan(c+dx))^2(A+B\tan(c+dx))\,dx$$

Optimal antiderivative

$$-2a^2(-iB+A)\,x+\frac{a^2B\ln(\cos(dx+c))}{d}+\frac{a^2(2iA+B)\ln(\sin(dx+c))}{d}-\frac{A\cot(dx+c)\,(a^2+ia^2\tan(dx+c))}{d}$$

command

```
integrate(cot(d*x+c)**2*(a+I*a*tan(d*x+c))**2*(A+B*tan(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2iAa^2}{de^{2ic}e^{2idx}-d}+\frac{Ba^2\log\left(e^{2idx}+e^{-2ic}\right)}{d}+\frac{ia^2\cdot(2A-iB)\log\left(e^{2idx}+\frac{(Aa^2-iBa^2-a^2\cdot(2A-iB))e^{-2ic}}{Aa^2}\right)}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

61.3 Problem number 30

$$\int\cot^2(c+dx)(a+ia\tan(c+dx))^4(A+B\tan(c+dx))\,dx$$

Optimal antiderivative

$$\begin{aligned}&-8a^4(-iB+A)\,x+\frac{a^4(4iA+7B)\ln(\cos(dx+c))}{d}\\&+\frac{a^4(4iA+B)\ln(\sin(dx+c))}{d}-\frac{aA\cot(dx+c)\left(a+ia\tan(dx+c)\right)^3}{d}\\&+\frac{(2iA-B)\left(a^2+ia^2\tan(dx+c)\right)^2}{2d}-\frac{3B\left(a^4+ia^4\tan(dx+c)\right)}{d}\end{aligned}$$

command

```
integrate(cot(d*x+c)**2*(a+I*a*tan(d*x+c))**4*(A+B*tan(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}&\frac{ia^4\cdot(4A-7iB)\log\left(e^{2idx}+\frac{(-4iAa^4-4Ba^4+ia^4\cdot(4A-7iB))e^{-2ic}}{3Ba^4}\right)}{d}\\&+\frac{ia^4\cdot(4A-iB)\log\left(e^{2idx}+\frac{(-4iAa^4-4Ba^4+ia^4\cdot(4A-iB))e^{-2ic}}{3Ba^4}\right)}{d}\\&+\frac{-4iAa^4+10Ba^4e^{4ic}e^{4idx}-8Ba^4+\left(-4iAa^4e^{2ic}-2Ba^4e^{2ic}\right)e^{2idx}}{de^{6ic}e^{6idx}+de^{4ic}e^{4idx}-de^{2ic}e^{2idx}-d}\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

61.4 Problem number 31

$$\int \cot^3(c+dx)(a+ia\tan(c+dx))^4(A+B\tan(c+dx))\,dx$$

Optimal antiderivative

$$-8a^4(iA+B)\,x-\frac{a^4(-4iB+A)\ln(\cos(dx+c))}{d}-\frac{a^4(-4iB+7A)\ln(\sin(dx+c))}{d}-\frac{aA(\cot^2(dx+c))\,(a+ia\tan(dx+c))^3}{2d}-\frac{(5iA+2B)\cot(dx+c)\,(a^2+ia^2\tan(dx+c))^2}{2d}-\frac{3A(a^4+ia^4\tan(dx+c))}{d}$$

command

```
integrate(cot(d*x+c)**3*(a+I*a*tan(d*x+c))**4*(A+B*tan(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{a^4(A-4iB)\log\left(e^{2idx}+\frac{(4Aa^4-4iBa^4-a^4(A-4iB))e^{-2ic}}{3Aa^4}\right)}{d}-\frac{a^4\cdot(7A-4iB)\log\left(e^{2idx}+\frac{(4Aa^4-4iBa^4-a^4\cdot(7A-4iB))e^{-2ic}}{3Aa^4}\right)}{d}+\frac{10Aa^4e^{4ic}e^{4idx}-8Aa^4+4iBa^4+\left(2Aa^4e^{2ic}-4iBa^4e^{2ic}\right)e^{2idx}}{de^{6ic}e^{6idx}-de^{4ic}e^{4idx}-de^{2ic}e^{2idx}+d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

62 Test file number 105

Test folder name:

`test_cases/4_Trig_functions/4.3_Tangent/105_4.3.4.2-a+b_tan-^m-c+d_tan-^n-A+B_tan+C_tan^2-`

62.1 Problem number 62

$$\int \frac{(c+d\tan(e+fx))^2\left(A+B\tan(e+fx)+C\tan^2(e+fx)\right)}{(a+b\tan(e+fx))^2}\,dx$$

Optimal antiderivative

$$-\frac{\left(a^{2}\left(c^{2}C+2Bcd-C\,d^{2}-A\left(c^{2}-d^{2}\right)\right)-b^{2}\left(c^{2}C+2Bcd-C\,d^{2}-A\left(c^{2}-d^{2}\right)\right)-2ab\left(2c(A-C)\,d+B\left(c^{2}-d^{2}\right)\right.}{\left(a^{2}+b^{2}\right)^{2}}$$
$$-\frac{\left(2ab\left(c^{2}C+2Bcd-C\,d^{2}-A\left(c^{2}-d^{2}\right)\right)+a^{2}\left(2c(A-C)\,d+B\left(c^{2}-d^{2}\right)\right)-b^{2}\left(2c(A-C)\,d+B\left(c^{2}-d^{2}\right)\right)\right)\ln\left(c\right.}{\left(a^{2}+b^{2}\right)^{2}f}$$
$$-\frac{\left(-ad+bc\right)\left(a^{3}bBd-2a^{4}Cd-b^{4}(2Ad+Bc)-a\,b^{3}(2Ac-3Bd-2cC)+a^{2}b^{2}(Bc-4Cd)\right)\ln\left(a+b\tan\left(fx+e\right.\right.}{b^{3}\left(a^{2}+b^{2}\right)^{2}f}$$
$$+\frac{\left(A\,b^{2}-abB+2a^{2}C+b^{2}C\right)d^{2}\tan\left(fx+e\right)}{b^{2}\left(a^{2}+b^{2}\right)f}-\frac{\left(A\,b^{2}-a(bB-aC)\right)\left(c+d\tan\left(fx+e\right)\right)^{2}}{b\left(a^{2}+b^{2}\right)f\left(a+b\tan\left(fx+e\right)\right)}$$

command

```
integrate((c+d*tan(f*x+e))**2*(A+B*tan(f*x+e)+C*tan(f*x+e)**2)/(a+b*tan(f*x+e))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

62.2 Problem number 68

$$\int\frac{(c+d\tan(e+fx))^{3}\left(A+B\tan(e+fx)+C\tan^{2}(e+fx)\right)}{(a+b\tan(e+fx))^{2}}\,dx$$

Optimal antiderivative

$$-\frac{\left(b^{2}\left(A\,c^{3}-3Ac\,d^{2}-3B\,c^{2}d+B\,d^{3}-c^{3}C+3cC\,d^{2}\right)+a^{2}\left(c^{3}C+3B\,c^{2}d-3cC\,d^{2}-B\,d^{3}-A\left(c^{3}-3c\,d^{2}\right)\right)-2ab\right.}{\left(a^{2}+b^{2}\right)^{2}}$$
$$+\frac{\left(2ab\left(A\,c^{3}-3Ac\,d^{2}-3B\,c^{2}d+B\,d^{3}-c^{3}C+3cC\,d^{2}\right)-a^{2}\left((A-C)\,d\left(3c^{2}-d^{2}\right)+B\left(c^{3}-3c\,d^{2}\right)\right)+b^{2}\left((A-C)\right.\right.}{\left(a^{2}+b^{2}\right)^{2}f}$$
$$-\frac{\left(-ad+bc\right)^{2}\left(2a^{3}bBd-3a^{4}Cd-b^{4}(3Ad+Bc)-2a\,b^{3}(Ac-2Bd-cC)+a^{2}b^{2}(Bc-(A+5C)\,d)\right)\ln\left(a+b\tan\right.}{b^{4}\left(a^{2}+b^{2}\right)^{2}f}$$
$$-\frac{d^{2}\left(3a^{3}Cd-A\,b^{2}(-ad+bc)-b^{3}(Bd+2cC)-a^{2}b(2Bd+3cC)+a\,b^{2}(Bc+2Cd)\right)\tan\left(fx+e\right)}{b^{3}\left(a^{2}+b^{2}\right)f}$$
$$+\frac{\left(2A\,b^{2}-2abB+3a^{2}C+b^{2}C\right)d\left(c+d\tan\left(fx+e\right)\right)^{2}}{2b^{2}\left(a^{2}+b^{2}\right)f}-\frac{\left(A\,b^{2}-a(bB-aC)\right)\left(c+d\tan\left(fx+e\right)\right)^{3}}{b\left(a^{2}+b^{2}\right)f\left(a+b\tan\left(fx+e\right)\right)}$$

command

```
integrate((c+d*tan(f*x+e))**3*(A+B*tan(f*x+e)+C*tan(f*x+e)**2)/(a+b*tan(f*x+e))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

62.3 Problem number 74

$$\int \frac{A + B\tan(e + fx) + C\tan^2(e + fx)}{(a + b\tan(e + fx))(c + d\tan(e + fx))}\,dx$$

Optimal antiderivative

$$\frac{(a(Ac + Bd - cC) + b(Bc - (A - C)\,d))\,x}{(a^2 + b^2)\,(c^2 + d^2)} + \frac{(A\,b^2 - a(bB - aC))\ln(a\cos(fx + e) + b\sin(fx + e))}{(a^2 + b^2)\,(-ad + bc)\,f} - \frac{(A\,d^2 - Bcd + c^2C)\ln(c\cos(fx + e) + d\sin(fx + e))}{(-ad + bc)\,(c^2 + d^2)\,f}$$

command

```
integrate((A+B*tan(f*x+e)+C*tan(f*x+e)**2)/(a+b*tan(f*x+e))/(c+d*tan(f*x+e)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

62.4 Problem number 77

$$\int \frac{(a + b\tan(e + fx))^3\,(A + B\tan(e + fx) + C\tan^2(e + fx))}{(c + d\tan(e + fx))^2}\,dx$$

Optimal antiderivative

$$-\frac{(a^3(c^2C - 2Bcd - C\,d^2 - A(c^2 - d^2)) - 3a\,b^2(c^2C - 2Bcd - C\,d^2 - A(c^2 - d^2)) - 3a^2b(2c(A - C)\,d - B(c^2 -}{(c^2 + d^2)^2}$$
$$+ \frac{(3a^2b(c^2C - 2Bcd - C\,d^2 - A(c^2 - d^2)) - b^3(c^2C - 2Bcd - C\,d^2 - A(c^2 - d^2)) + a^3(2c(A - C)\,d - B(c^2 - d^2)}{(c^2 + d^2)^2\,f}$$
$$+ \frac{(-ad + bc)^2\,(b(3c^4C - 2B\,c^3d + c^2(A + 5C)\,d^2 - 4Bc\,d^3 + 3A\,d^4) + a\,d^2(2c(A - C)\,d - B(c^2 - d^2)))\ln(c + d\,\mathrm{ta}}{d^4\,(c^2 + d^2)^2\,f}$$
$$+ \frac{b^2(ad(3c^2C - Bcd + (A + 2C)\,d^2) - b(3c^3C - 2B\,c^2d + c(A + 2C)\,d^2 - B\,d^3))\tan(fx + e)}{d^3\,(c^2 + d^2)\,f}$$
$$+ \frac{b(3c^2C - 2Bcd + (2A + C)\,d^2)\,(a + b\tan(fx + e))^2}{2d^2\,(c^2 + d^2)\,f} - \frac{(A\,d^2 - Bcd + c^2C)\,(a + b\tan(fx + e))^3}{d\,(c^2 + d^2)\,f\,(c + d\tan(fx + e))}$$

command

```
integrate((a+b*tan(f*x+e))**3*(A+B*tan(f*x+e)+C*tan(f*x+e)**2)/(c+d*tan(f*x+e))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

62.5 Problem number 78

$$\int \frac{(a+b\tan(e+fx))^2 \left(A+B\tan(e+fx)+C\tan^2(e+fx)\right)}{(c+d\tan(e+fx))^2}\,dx$$

Optimal antiderivative

$$-\frac{\left(a^2\left(c^2C-2Bcd-C\,d^2-A\left(c^2-d^2\right)\right)-b^2\left(c^2C-2Bcd-C\,d^2-A\left(c^2-d^2\right)\right)-2ab\left(2c(A-C)\,d-B\left(c^2-d^2\right)\right.}{\left(c^2+d^2\right)^2}$$
$$+\frac{\left(2ab\left(c^2C-2Bcd-C\,d^2-A\left(c^2-d^2\right)\right)+a^2\left(2c(A-C)\,d-B\left(c^2-d^2\right)\right)-b^2\left(2c(A-C)\,d-B\left(c^2-d^2\right)\right)\right)\ln\left(\mathrm{co}\right.}{\left(c^2+d^2\right)^2 f}$$
$$-\frac{(-ad+bc)\left(b\left(2A\,d^4-B\,c^3d-3Bc\,d^3+2c^4C+4c^2C\,d^2\right)+a\,d^2\left(2c(A-C)\,d-B\left(c^2-d^2\right)\right)\right)\ln\left(c+d\tan\left(fx+\right.\right.}{d^3\left(c^2+d^2\right)^2 f}$$
$$+\frac{b^2\left(2c^2C-Bcd+(A+C)\,d^2\right)\tan\left(fx+e\right)}{d^2\left(c^2+d^2\right)f}-\frac{\left(A\,d^2-Bcd+c^2C\right)\left(a+b\tan\left(fx+e\right)\right)^2}{d\left(c^2+d^2\right)f\left(c+d\tan\left(fx+e\right)\right)}$$

command

```
integrate((a+b*tan(f*x+e))**2*(A+B*tan(f*x+e)+C*tan(f*x+e)**2)/(c+d*tan(f*x+e))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

63 Test file number 106

Test folder name:

```
test_cases/4_Trig_functions/4.3_Tangent/106_4.3.7-d_trig-^m-a+b-c_tan-^n-^p
```

63.1 Problem number 227

$$\int \frac{\cot(e+fx)}{\left(a+b\tan^2(e+fx)\right)^2}\,dx$$

Optimal antiderivative

$$\frac{\ln\left(\cos\left(fx+e\right)\right)}{\left(a-b\right)^2 f}+\frac{\ln\left(\tan\left(fx+e\right)\right)}{a^2 f}+\frac{\left(2a-b\right)b\ln\left(a+b\left(\tan^2\left(fx+e\right)\right)\right)}{2a^2\left(a-b\right)^2 f}$$
$$-\frac{b}{2a\left(a-b\right)f\left(a+b\left(\tan^2\left(fx+e\right)\right)\right)}$$

command

```
integrate(cot(f*x+e)/(a+b*tan(f*x+e)**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

63.2 Problem number 228

$$\int \frac{\cot^3(e+fx)}{\left(a+b\tan^2(e+fx)\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{\cot^2\left(fx+e\right)}{2a^2 f}-\frac{\ln\left(\cos\left(fx+e\right)\right)}{\left(a-b\right)^2 f}-\frac{\left(a+2b\right)\ln\left(\tan\left(fx+e\right)\right)}{a^3 f}$$
$$-\frac{\left(3a-2b\right)b^2\ln\left(a+b\left(\tan^2\left(fx+e\right)\right)\right)}{2a^3\left(a-b\right)^2 f}+\frac{b^2}{2a^2\left(a-b\right)f\left(a+b\left(\tan^2\left(fx+e\right)\right)\right)}$$

command

```
integrate(cot(f*x+e)**3/(a+b*tan(f*x+e)**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

63.3 Problem number 234

$$\int \frac{\cot^2(e+fx)}{\left(a+b\tan^2(e+fx)\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{x}{(a-b)^2}+\frac{(5a-3b)\,b^{\frac{3}{2}}\arctan\left(\frac{\sqrt{b}\,\tan(fx+e)}{\sqrt{a}}\right)}{2a^{\frac{5}{2}}\,(a-b)^2\,f}-\frac{(2a-3b)\cot(fx+e)}{2a^2\,(a-b)\,f}-\frac{b\cot(fx+e)}{2a\,(a-b)\,f\,\left(a+b\left(\tan^2(fx+e)\right)\right)}$$

command

```
integrate(cot(f*x+e)**2/(a+b*tan(f*x+e)**2)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

64 Test file number 115

Test folder name:

`test_cases/4_Trig_functions/4.5_Secant/115_4.5.0-a_sec-^m-b_trg-^n`

64.1 Problem number 148

$$\int \frac{(b\sec(c+dx))^{3/2}}{\sec^{\frac{5}{2}}(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{b\sin(dx+c)\,\sqrt{b\sec(dx+c)}}{d\sqrt{\sec(dx+c)}}$$

command

```
integrate((b*sec(d*x+c))**(3/2)/sec(d*x+c)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{(b\sec(c+dx))^{\frac{3}{2}}\tan(c+dx)}{d\sec^{\frac{5}{2}}(c+dx)} & \text{for } d \neq 0 \\ \frac{x(b\sec(c))^{\frac{3}{2}}}{\sec^{\frac{5}{2}}(c)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

64.2 Problem number 167

$$\int \frac{1}{\sec^{\frac{5}{2}}(c+dx)\sqrt{b\sec(c+dx)}}\,dx$$

Optimal antiderivative

$$\frac{\sin(dx+c)\left(\sqrt{\sec}\,(dx+c)\right)}{d\sqrt{b\sec(dx+c)}} - \frac{\left(\sin^3(dx+c)\right)\left(\sqrt{\sec}\,(dx+c)\right)}{3d\sqrt{b\sec(dx+c)}}$$

command

```
integrate(1/sec(d*x+c)**(5/2)/(b*sec(d*x+c))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2\tan^3(c+dx)}{3d\sqrt{b\sec(c+dx)}\sec^{\frac{5}{2}}(c+dx)} + \frac{\tan(c+dx)}{d\sqrt{b\sec(c+dx)}\sec^{\frac{5}{2}}(c+dx)} & \text{for } d \neq 0 \\ \frac{x}{\sqrt{b\sec(c)}\sec^{\frac{5}{2}}(c)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

64.3 Problem number 180

$$\int \frac{\sec^{\frac{3}{2}}(c+dx)}{(b\sec(c+dx))^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{\sin(dx+c)\left(\sqrt{\sec}\,(dx+c)\right)}{b^2 d\sqrt{b\sec(dx+c)}}$$

command

```
integrate(sec(d*x+c)**(3/2)/(b*sec(d*x+c))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tan{(c+dx)}\sec^{\frac{3}{2}}{(c+dx)}}{d(b\sec{(c+dx)})^{\frac{5}{2}}} & \text{for } d \neq 0 \\ \frac{x\sec^{\frac{3}{2}}{(c)}}{(b\sec{(c)})^{\frac{5}{2}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

64.4 Problem number 182

$$\int \frac{1}{\sqrt{\sec(c+dx)}\,(b\sec(c+dx))^{5/2}}\,dx$$

Optimal antiderivative

$$\frac{\sin{(dx+c)}\left(\sqrt{\sec}\,(dx+c)\right)}{b^2d\sqrt{b\sec{(dx+c)}}}-\frac{\left(\sin^3{(dx+c)}\right)\left(\sqrt{\sec}\,(dx+c)\right)}{3b^2d\sqrt{b\sec{(dx+c)}}}$$

command

```
integrate(1/sec(d*x+c)**(1/2)/(b*sec(d*x+c))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2\tan^3{(c+dx)}}{3d(b\sec{(c+dx)})^{\frac{5}{2}}\sqrt{\sec{(c+dx)}}}+\frac{\tan{(c+dx)}}{d(b\sec{(c+dx)})^{\frac{5}{2}}\sqrt{\sec{(c+dx)}}} & \text{for } d \neq 0 \\ \frac{x}{(b\sec{(c)})^{\frac{5}{2}}\sqrt{\sec{(c)}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

65 Test file number 126

Test folder name:

test_cases/4_Trig_functions/4.5_Secant/126_4.5.7-d_trig-^m-a+b-c_sec-^n-^p

65.1 Problem number 363

$$\int \frac{\tan^5(e+fx)}{(a+b\sec^2(e+fx))^3}\,dx$$

Optimal antiderivative

$$\frac{(a+b)^2}{4a^3f\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)^2}+\frac{-a-b}{a^3f\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)}-\frac{\ln\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)}{2a^3f}$$

command

```
integrate(tan(f*x+e)**5/(a+b*sec(f*x+e)**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

65.2 Problem number 364

$$\int \frac{\tan^3(e+fx)}{(a+b\sec^2(e+fx))^3}\,dx$$

Optimal antiderivative

$$-\frac{b(a+b)}{4a^3f\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)^2}+\frac{a+2b}{2a^3f\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)}+\frac{\ln\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)}{2a^3f}$$

command

```
integrate(tan(f*x+e)**3/(a+b*sec(f*x+e)**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

65.3 Problem number 365

$$\int \frac{\tan(e+fx)}{\left(a+b\sec^2(e+fx)\right)^3}\,dx$$

Optimal antiderivative

$$\frac{b^2}{4a^3f\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)^2}-\frac{b}{a^3f\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)}-\frac{\ln\left(b+a\left(\cos^2\left(fx+e\right)\right)\right)}{2a^3f}$$

command

```
integrate(tan(f*x+e)/(a+b*sec(f*x+e)**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\tilde{\infty}x\tan\left(e\right)}{\sec^6\left(e\right)} \\ \frac{\log\left(\tan^2\left(e+fx\right)+1\right)}{2a^3f} \\ -\frac{1}{6b^3f\sec^6\left(e+fx\right)} \\ \frac{x\tan\left(e\right)}{\left(a+b\sec^2\left(e\right)\right)^3} \\ -\frac{2a^2\log\left(-\sqrt{-\frac{a}{b}}+\sec\left(e+fx\right)\right)}{4a^5f+8a^4bf\sec^2\left(e+fx\right)+4a^3b^2f\sec^4\left(e+fx\right)}-\frac{2a^2\log\left(\sqrt{-\frac{a}{b}}+\sec\left(e+fx\right)\right)}{4a^5f+8a^4bf\sec^2\left(e+fx\right)+4a^3b^2f\sec^4\left(e+fx\right)}+\frac{2a^2\log\left(\tan^2\left(e+fx\right)+1\right)}{4a^5f+8a^4bf\sec^2\left(e+fx\right)+4a^3b^2f\sec^4\left(e\right.} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66 Test file number 135

Test folder name:

`test_cases/4_Trig_functions/4.7_Miscellaneous/135_4.7.1-c_trig-^m-d_trig-^n`

66.1 Problem number 1

$$\int \sin(a+bx)\sin^7(2a+2bx)\,dx$$

Optimal antiderivative

$$\frac{128\left(\sin^9\left(bx+a\right)\right)}{9b}-\frac{384\left(\sin^{11}\left(bx+a\right)\right)}{11b}+\frac{384\left(\sin^{13}\left(bx+a\right)\right)}{13b}-\frac{128\left(\sin^{15}\left(bx+a\right)\right)}{15b}$$

command

```
integrate(sin(b*x+a)*sin(2*b*x+2*a)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{3838\sin(a+bx)\sin^6(2a+2bx)\cos(2a+2bx)}{6435b} - \frac{1648\sin(a+bx)\sin^4(2a+2bx)\cos^3(2a+2bx)}{1287b} - \frac{768\sin(a+bx)\sin^2(2a+2bx)\cos^5(2a+2bx)}{715b} - \\ x\sin(a)\sin^7(2a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.2 Problem number 2

$$\int \sin(a+bx)\sin^6(2a+2bx)\,dx$$

Optimal antiderivative

$$-\frac{64(\cos^7(bx+a))}{7b} + \frac{64(\cos^9(bx+a))}{3b} - \frac{192(\cos^{11}(bx+a))}{11b} + \frac{64(\cos^{13}(bx+a))}{13b}$$

command

```
integrate(sin(b*x+a)*sin(2*b*x+2*a)**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1084\sin(a+bx)\sin^5(2a+2bx)\cos(2a+2bx)}{3003b} - \frac{64\sin(a+bx)\sin^3(2a+2bx)\cos^3(2a+2bx)}{143b} - \frac{512\sin(a+bx)\sin(2a+2bx)\cos^5(2a+2bx)}{3003b} - 8 \\ x\sin(a)\sin^6(2a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.3 Problem number 13

$$\int \sin^2(a+bx)\sin^5(2a+2bx)\,dx$$

Optimal antiderivative

$$\frac{4(\sin^8(bx+a))}{b} - \frac{32(\sin^{10}(bx+a))}{5b} + \frac{8(\sin^{12}(bx+a))}{3b}$$

command

`integrate(sin(b*x+a)**2*sin(2*b*x+2*a)**5,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{5x\sin^2(a+bx)\sin^5(2a+2bx)}{32} + \frac{5x\sin^2(a+bx)\sin^3(2a+2bx)\cos^2(2a+2bx)}{16} + \frac{5x\sin^2(a+bx)\sin(2a+2bx)\cos^4(2a+2bx)}{32} + \frac{5x\sin(a+bx)\sin \\ x\sin^2(a)\sin^5(2a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.4 Problem number 23

$$\int \sin^3(a+bx)\sin^5(2a+2bx)\,dx$$

Optimal antiderivative

$$\frac{32(\sin^9(bx+a))}{9b} - \frac{64(\sin^{11}(bx+a))}{11b} + \frac{32(\sin^{13}(bx+a))}{13b}$$

command

`integrate(sin(b*x+a)**3*sin(2*b*x+2*a)**5,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1366\sin^3(a+bx)\sin^4(2a+2bx)\cos(2a+2bx)}{3003b} - \frac{4960\sin^3(a+bx)\sin^2(2a+2bx)\cos^3(2a+2bx)}{9009b} - \frac{256\sin^3(a+bx)\cos^5(2a+2bx)}{1287b} - \frac{271\sin^2 \\ x\sin^3(a)\sin^5(2a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.5 Problem number 24

$$\int \sin^3(a+bx)\sin^4(2a+2bx)\,dx$$

Optimal antiderivative

$$-\frac{16(\cos^5(bx+a))}{5b} + \frac{48(\cos^7(bx+a))}{7b} - \frac{16(\cos^9(bx+a))}{3b} + \frac{16(\cos^{11}(bx+a))}{11b}$$

command

```
integrate(sin(b*x+a)**3*sin(2*b*x+2*a)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{472\sin^3(a+bx)\sin^3(2a+2bx)\cos(2a+2bx)}{1155b} - \frac{64\sin^3(a+bx)\sin(2a+2bx)\cos^3(2a+2bx)}{231b} - \frac{211\sin^2(a+bx)\sin^4(2a+2bx)\cos(a+bx)}{1155b} - 30 \\ x\sin^3(a)\sin^4(2a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.6 Problem number 39

$$\int \csc(a+bx)\sin^2(2a+2bx)\,dx$$

Optimal antiderivative

$$-\frac{4(\cos^3(bx+a))}{3b}$$

command

```
integrate(csc(b*x+a)*sin(2*b*x+2*a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

66.7 Problem number 52

$$\int \csc^2(a+bx)\sin(2a+2bx)\,dx$$

Optimal antiderivative

$$\frac{2\ln(\sin(bx+a))}{b}$$

command

```
integrate(csc(b*x+a)**2*sin(2*b*x+2*a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

66.8 Problem number 129

$$\int \cos(a+bx)\sin^7(2a+2bx)\,dx$$

Optimal antiderivative

$$-\frac{128(\cos^9(bx+a))}{9b}+\frac{384(\cos^{11}(bx+a))}{11b}-\frac{384(\cos^{13}(bx+a))}{13b}+\frac{128(\cos^{15}(bx+a))}{15b}$$

command

```
integrate(cos(b*x+a)*sin(2*b*x+2*a)**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1241\sin(a+bx)\sin^7(2a+2bx)}{6435b}-\frac{376\sin(a+bx)\sin^5(2a+2bx)\cos^2(2a+2bx)}{715b}-\frac{640\sin(a+bx)\sin^3(2a+2bx)\cos^4(2a+2bx)}{1287b}-1024\sin(a+ \\ x\sin^7(2a)\cos(a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.9 Problem number 130

$$\int \cos(a+bx)\sin^6(2a+2bx)\,dx$$

Optimal antiderivative

$$\frac{64(\sin^7(bx+a))}{7b}-\frac{64(\sin^9(bx+a))}{3b}+\frac{192(\sin^{11}(bx+a))}{11b}-\frac{64(\sin^{13}(bx+a))}{13b}$$

command

```
integrate(cos(b*x+a)*sin(2*b*x+2*a)**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{835\sin(a+bx)\sin^6(2a+2bx)}{3003b}+\frac{2776\sin(a+bx)\sin^4(2a+2bx)\cos^2(2a+2bx)}{3003b}+\frac{2944\sin(a+bx)\sin^2(2a+2bx)\cos^4(2a+2bx)}{3003b}+1024\sin(a+b \\ x\sin^6(2a)\cos(a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.10 Problem number 141

$$\int \cos^2(a+bx)\sin^5(2a+2bx)\,dx$$

Optimal antiderivative

$$-\frac{4(\cos^8(bx+a))}{b}+\frac{32(\cos^{10}(bx+a))}{5b}-\frac{8(\cos^{12}(bx+a))}{3b}$$

command

`integrate(cos(b*x+a)**2*sin(2*b*x+2*a)**5,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{5x\sin^2(a+bx)\sin^5(2a+2bx)}{32}-\frac{5x\sin^2(a+bx)\sin^3(2a+2bx)\cos^2(2a+2bx)}{16}-\frac{5x\sin^2(a+bx)\sin(2a+2bx)\cos^4(2a+2bx)}{32}-\frac{5x\sin(a+bx)\,\mathrm{s}}{} \\ x\sin^5(2a)\cos^2(a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.11 Problem number 151

$$\int \cos^3(a+bx)\sin^5(2a+2bx)\,dx$$

Optimal antiderivative

$$-\frac{32(\cos^9(bx+a))}{9b}+\frac{64(\cos^{11}(bx+a))}{11b}-\frac{32(\cos^{13}(bx+a))}{13b}$$

command

`integrate(cos(b*x+a)**3*sin(2*b*x+2*a)**5,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2234\sin^3(a+bx)\sin^5(2a+2bx)}{9009b}-\frac{4544\sin^3(a+bx)\sin^3(2a+2bx)\cos^2(2a+2bx)}{9009b}-\frac{256\sin^3(a+bx)\sin(2a+2bx)\cos^4(2a+2bx)}{1001b}-\frac{1388\sin^2}{} \\ x\sin^5(2a)\cos^3(a) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.12 Problem number 152

$$\int \cos^3(a+bx)\sin^4(2a+2bx)\,dx$$

Optimal antiderivative

$$\frac{16(\sin^5(bx+a))}{5b}-\frac{48(\sin^7(bx+a))}{7b}+\frac{16(\sin^9(bx+a))}{3b}-\frac{16(\sin^{11}(bx+a))}{11b}$$

command

`integrate(cos(b*x+a)**3*sin(2*b*x+2*a)**4,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{46\sin^3(a+bx)\sin^4(2a+2bx)}{165b}+\frac{192\sin^3(a+bx)\sin^2(2a+2bx)\cos^2(2a+2bx)}{385b}+\frac{256\sin^3(a+bx)\cos^4(2a+2bx)}{1155b}+\frac{272\sin^2(a+bx)\sin^3(2a+2b}{115}\\ x\sin^4(2a)\cos^3(a)\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.13 Problem number 190

$$\int \cos^2(a+bx)\sin^3(a+bx)\sin^2(2a+2bx)\,dx$$

Optimal antiderivative

$$-\frac{4(\cos^5(bx+a))}{5b}+\frac{8(\cos^7(bx+a))}{7b}-\frac{4(\cos^9(bx+a))}{9b}$$

command

`integrate(cos(b*x+a)**2*sin(b*x+a)**3*sin(2*b*x+2*a)**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{8\sin^5(a+bx)\sin(2a+2bx)\cos(2a+2bx)}{315b}+\frac{16\sin^4(a+bx)\sin^2(2a+2bx)\cos(a+bx)}{315b}-\frac{16\sin^4(a+bx)\cos(a+bx)\cos^2(2a+2bx)}{315b}+\frac{44\sin^3(a}{}\\ x\sin^3(a)\sin^2(2a)\cos^2(a)\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

66.14 Problem number 208

$$\int \sin^3(a+bx)\sin^3(c+dx)\,dx$$

Optimal antiderivative

$$-\frac{3\sin(a-3c+(b-3d)x)}{32(b-3d)}+\frac{9\sin(a-c+(b-d)x)}{32(b-d)}+\frac{\sin(3a-3c+3(b-d)x)}{96b-96d} -\frac{3\sin(3a-c+(3b-d)x)}{32(3b-d)}-\frac{9\sin(a+c+(b+d)x)}{32(b+d)}-\frac{\sin(3a+3c+3(b+d)x)}{96(b+d)} +\frac{3\sin(3a+c+(3b+d)x)}{32(3b+d)}+\frac{3\sin(a+3c+(b+3d)x)}{32(b+3d)}$$

command

```
integrate(sin(b*x+a)**3*sin(d*x+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

66.15 Problem number 226

$$\int \cos^3(c+dx)\sin^3(a+bx)\,dx$$

Optimal antiderivative

$$-\frac{3\cos(a-3c+(b-3d)x)}{32(b-3d)}-\frac{9\cos(a-c+(b-d)x)}{32(b-d)}+\frac{\cos(3a-3c+3(b-d)x)}{96b-96d} +\frac{3\cos(3a-c+(3b-d)x)}{32(3b-d)}-\frac{9\cos(a+c+(b+d)x)}{32(b+d)}+\frac{\cos(3a+3c+3(b+d)x)}{96b+96d} +\frac{3\cos(3a+c+(3b+d)x)}{32(3b+d)}-\frac{3\cos(a+3c+(b+3d)x)}{32(b+3d)}$$

command

```
integrate(cos(d*x+c)**3*sin(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

66.16 Problem number 246

$$\int \cos^3(a+bx)\cos^3(c+dx)\,dx$$

Optimal antiderivative

$$\frac{3\sin(a-3c+(b-3d)x)}{32(b-3d)}+\frac{9\sin(a-c+(b-d)x)}{32(b-d)}+\frac{\sin(3a-3c+3(b-d)x)}{96b-96d}+\frac{3\sin(3a-c+(3b-d)x)}{32(3b-d)}+\frac{9\sin(a+c+(b+d)x)}{32(b+d)}+\frac{\sin(3a+3c+3(b+d)x)}{96b+96d}+\frac{3\sin(3a+c+(3b+d)x)}{32(3b+d)}+\frac{3\sin(a+3c+(b+3d)x)}{32(b+3d)}$$

command

```
integrate(cos(b*x+a)**3*cos(d*x+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

67 Test file number 136

Test folder name:

`test_cases/4_Trig_functions/4.7_Miscellaneous/136_4.7.2_trig^m-a_trig+b_trig-^n`

67.1 Problem number 9

$$\int \frac{\sin^2(x)}{a\cos(x)+b\sin(x)}\,dx$$

Optimal antiderivative

$$-\frac{a^2\operatorname{arctanh}\left(\frac{b\cos(x)-a\sin(x)}{\sqrt{a^2+b^2}}\right)}{(a^2+b^2)^{\frac{3}{2}}}-\frac{b\cos(x)}{a^2+b^2}-\frac{a\sin(x)}{a^2+b^2}$$

command

```
integrate(sin(x)**2/(a*cos(x)+b*sin(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\cos(x) \\ -\frac{\cos(x)}{b} \\ -\frac{\sin^2(x)}{3ib\sin(x)+3b\cos(x)} - \frac{2i\sin(x)\cos(x)}{3ib\sin(x)+3b\cos(x)} - \frac{2\cos^2(x)}{3ib\sin(x)+3b\cos(x)} \\ -\frac{\sin^2(x)}{-3ib\sin(x)+3b\cos(x)} + \frac{2i\sin(x)\cos(x)}{-3ib\sin(x)+3b\cos(x)} - \frac{2\cos^2(x)}{-3ib\sin(x)+3b\cos(x)} \\ -\frac{a^2\log\left(\tan\left(\frac{x}{2}\right)-\frac{b}{a}-\frac{\sqrt{a^2+b^2}}{a}\right)\tan^2\left(\frac{x}{2}\right)}{a^2\sqrt{a^2+b^2}\tan^2\left(\frac{x}{2}\right)+a^2\sqrt{a^2+b^2}+b^2\sqrt{a^2+b^2}\tan^2\left(\frac{x}{2}\right)+b^2\sqrt{a^2+b^2}} - \frac{a^2\log\left(\tan\left(\frac{x}{2}\right)-\frac{b}{a}-\frac{\sqrt{a^2+}}{a}\right.}{a^2\sqrt{a^2+b^2}\tan^2\left(\frac{x}{2}\right)+a^2\sqrt{a^2+b^2}+b^2\sqrt{a^2+}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

67.2 Problem number 113

$$\int \frac{\cos^2(c+dx)}{a\cos(c+dx)+b\sin(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{b^2\,\mathrm{arctanh}\left(\frac{b\cos(dx+c)-a\sin(dx+c)}{\sqrt{a^2+b^2}}\right)}{(a^2+b^2)^{\frac{3}{2}}\,d}+\frac{b\cos(dx+c)}{(a^2+b^2)\,d}+\frac{a\sin(dx+c)}{(a^2+b^2)\,d}$$

command

```
integrate(cos(d*x+c)**2/(a*cos(d*x+c)+b*sin(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

67.3 Problem number 275

$$\int \frac{\cos(x)\sin(x)}{a\cos(x)+b\sin(x)}\,dx$$

Optimal antiderivative

$$\frac{ab\,\mathrm{arctanh}\left(\frac{b\cos(x)-a\sin(x)}{\sqrt{a^2+b^2}}\right)}{(a^2+b^2)^{\frac{3}{2}}}-\frac{a\cos(x)}{a^2+b^2}+\frac{b\sin(x)}{a^2+b^2}$$

command

```
integrate(cos(x)*sin(x)/(a*cos(x)+b*sin(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\sin(x) \\ \frac{\sin(x)}{b} \\ \frac{i\sin^2(x)}{3ib\sin(x)+3b\cos(x)} + \frac{\sin(x)\cos(x)}{3ib\sin(x)+3b\cos(x)} - \frac{i\cos^2(x)}{3ib\sin(x)+3b\cos(x)} \\ -\frac{i\sin^2(x)}{-3ib\sin(x)+3b\cos(x)} + \frac{\sin(x)\cos(x)}{-3ib\sin(x)+3b\cos(x)} + \frac{i\cos^2(x)}{-3ib\sin(x)+3b\cos(x)} \\ \frac{ab\log\left(\tan\left(\frac{x}{2}\right)-\frac{b}{a}-\frac{\sqrt{a^2+b^2}}{a}\right)\tan^2\left(\frac{x}{2}\right)}{a^2\sqrt{a^2+b^2}\tan^2\left(\frac{x}{2}\right)+a^2\sqrt{a^2+b^2}+b^2\sqrt{a^2+b^2}\tan^2\left(\frac{x}{2}\right)+b^2\sqrt{a^2+b^2}} + \frac{ab\log\left(\tan\left(\frac{x}{2}\right)-\frac{b}{a}-\frac{\sqrt{a^2+b}}{a}\right.}{a^2\sqrt{a^2+b^2}\tan^2\left(\frac{x}{2}\right)+a^2\sqrt{a^2+b^2}+b^2\sqrt{a^2+b}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

68 Test file number 137

Test folder name:

`test_cases/4_Trig_functions/4.7_Miscellaneous/137_4.7.3-c+d_x-^m_trig^n_trig^p`

68.1 Problem number 52

$$\int (c+dx)^{5/2}\cos(a+bx)\sin(a+bx)\,dx$$

Optimal antiderivative

$$-\frac{(dx+c)^{\frac{5}{2}}\cos(2bx+2a)}{4b} + \frac{5d(dx+c)^{\frac{3}{2}}\sin(2bx+2a)}{16b^2} - \frac{15d^{\frac{5}{2}}\cos\left(2a-\frac{2bc}{d}\right)\operatorname{FresnelC}\left(\frac{2\sqrt{b}\,\sqrt{dx+c}}{\sqrt{d}\,\sqrt{\pi}}\right)\sqrt{\pi}}{128b^{\frac{7}{2}}} + \frac{15d^{\frac{5}{2}}\operatorname{S}\left(\frac{2\sqrt{b}\,\sqrt{dx+c}}{\sqrt{d}\,\sqrt{\pi}}\right)\sin\left(2a-\frac{2bc}{d}\right)\sqrt{\pi}}{128b^{\frac{7}{2}}} + \frac{15d^2\cos(2bx+2a)\sqrt{dx+c}}{64b^3}$$

command

```
integrate((d*x+c)**(5/2)*cos(b*x+a)*sin(b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{3b^{\frac{3}{2}}\sqrt{\frac{d}{b}}\,(c+dx)^{\frac{9}{2}}\cos\left(2a-\frac{2bc}{d}\right)\Gamma\left(\frac{3}{4}\right)\Gamma\left(\frac{9}{4}\right){}_2F_3\left(\begin{matrix}\frac{3}{4},\frac{9}{4}\\ \frac{3}{2},\frac{7}{4},\frac{13}{4}\end{matrix}\middle|-\frac{b^2(c+dx)^2}{d^2}\right)}{4d^{\frac{5}{2}}\Gamma\left(\frac{7}{4}\right)\Gamma\left(\frac{13}{4}\right)}$$
$$-\frac{3\sqrt{b}\sqrt{\frac{d}{b}}\,(c+dx)^{\frac{7}{2}}\sin\left(2a-\frac{2bc}{d}\right)\Gamma\left(\frac{1}{4}\right)\Gamma\left(\frac{7}{4}\right){}_2F_3\left(\begin{matrix}\frac{1}{4},\frac{7}{4}\\ \frac{1}{2},\frac{5}{4},\frac{11}{4}\end{matrix}\middle|-\frac{b^2(c+dx)^2}{d^2}\right)}{8d^{\frac{3}{2}}\Gamma\left(\frac{5}{4}\right)\Gamma\left(\frac{11}{4}\right)}$$
$$+\frac{\sqrt{\pi}\sqrt{\frac{d}{b}}\,(c+dx)^3\sin\left(2a-\frac{2bc}{d}\right)C\left(\frac{2b\sqrt{c+dx}}{\sqrt{\pi}\,d\sqrt{\frac{b}{d}}}\right)}{2d}$$
$$+\frac{\sqrt{\pi}\sqrt{\frac{d}{b}}\,(c+dx)^3\cos\left(2a-\frac{2bc}{d}\right)S\left(\frac{2b\sqrt{c+dx}}{\sqrt{\pi}\,d\sqrt{\frac{b}{d}}}\right)}{2d}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

68.2 Problem number 57

$$\int (c+dx)^{5/2}\cos(a+bx)\sin(a+bx)\,dx$$

Optimal antiderivative

$$-\frac{(dx+c)^{\frac{5}{2}}\cos(2bx+2a)}{4b}+\frac{5d(dx+c)^{\frac{3}{2}}\sin(2bx+2a)}{16b^2}$$
$$-\frac{15d^{\frac{5}{2}}\cos\left(2a-\frac{2bc}{d}\right)\operatorname{FresnelC}\left(\frac{2\sqrt{b}\,\sqrt{dx+c}}{\sqrt{d}\,\sqrt{\pi}}\right)\sqrt{\pi}}{128b^{\frac{7}{2}}}$$
$$+\frac{15d^{\frac{5}{2}}\operatorname{S}\left(\frac{2\sqrt{b}\,\sqrt{dx+c}}{\sqrt{d}\,\sqrt{\pi}}\right)\sin\left(2a-\frac{2bc}{d}\right)\sqrt{\pi}}{128b^{\frac{7}{2}}}+\frac{15d^2\cos(2bx+2a)\sqrt{dx+c}}{64b^3}$$

command

```
integrate((d*x+c)**(5/2)*cos(b*x+a)*sin(b*x+a),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{3b^{\frac{3}{2}}\sqrt{\frac{d}{b}}\,(c+dx)^{\frac{9}{2}}\cos\left(2a-\frac{2bc}{d}\right)\Gamma\left(\frac{3}{4}\right)\Gamma\left(\frac{9}{4}\right){}_2F_3\left(\begin{matrix}\frac{3}{4},\frac{9}{4}\\ \frac{3}{2},\frac{7}{4},\frac{13}{4}\end{matrix}\middle|-\frac{b^2(c+dx)^2}{d^2}\right)}{4d^{\frac{5}{2}}\Gamma\left(\frac{7}{4}\right)\Gamma\left(\frac{13}{4}\right)}$$
$$-\frac{3\sqrt{b}\sqrt{\frac{d}{b}}\,(c+dx)^{\frac{7}{2}}\sin\left(2a-\frac{2bc}{d}\right)\Gamma\left(\frac{1}{4}\right)\Gamma\left(\frac{7}{4}\right){}_2F_3\left(\begin{matrix}\frac{1}{4},\frac{7}{4}\\ \frac{1}{2},\frac{5}{4},\frac{11}{4}\end{matrix}\middle|-\frac{b^2(c+dx)^2}{d^2}\right)}{8d^{\frac{3}{2}}\Gamma\left(\frac{5}{4}\right)\Gamma\left(\frac{11}{4}\right)}$$
$$+\frac{\sqrt{\pi}\sqrt{\frac{d}{b}}\,(c+dx)^3\sin\left(2a-\frac{2bc}{d}\right)C\left(\frac{2b\sqrt{c+dx}}{\sqrt{\pi}\,d\sqrt{\frac{b}{d}}}\right)}{2d}$$
$$+\frac{\sqrt{\pi}\sqrt{\frac{d}{b}}\,(c+dx)^3\cos\left(2a-\frac{2bc}{d}\right)S\left(\frac{2b\sqrt{c+dx}}{\sqrt{\pi}\,d\sqrt{\frac{b}{d}}}\right)}{2d}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

69 Test file number 139

Test folder name:

`test_cases/4_Trig_functions/4.7_Miscellaneous/139_4.7.5_x^m_trig-a+b_log-c_x^n-^p`

69.1 Problem number 23

$$\int \frac{\sin^4\left(a+b\log\left(cx^n\right)\right)}{x^2}\,dx$$

Optimal antiderivative

$$-\frac{24b^4n^4}{(64b^4n^4+20b^2n^2+1)\,x}-\frac{24b^3n^3\cos\left(a+b\ln\left(c\,x^n\right)\right)\sin\left(a+b\ln\left(c\,x^n\right)\right)}{(64b^4n^4+20b^2n^2+1)\,x}$$
$$-\frac{12b^2n^2\left(\sin^2\left(a+b\ln\left(c\,x^n\right)\right)\right)}{(64b^4n^4+20b^2n^2+1)\,x}$$
$$-\frac{4bn\cos\left(a+b\ln\left(c\,x^n\right)\right)\left(\sin^3\left(a+b\ln\left(c\,x^n\right)\right)\right)}{(16b^2n^2+1)\,x}-\frac{\sin^4\left(a+b\ln\left(c\,x^n\right)\right)}{(16b^2n^2+1)\,x}$$

command

```
integrate(sin(a+b*ln(c*x**n))**4/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

69.2 Problem number 24

$$\int \frac{\sin^4(a + b\log(cx^n))}{x^3}\,dx$$

Optimal antiderivative

$$-\frac{3b^4n^4}{4(4b^4n^4+5b^2n^2+1)x^2} - \frac{3b^3n^3\cos(a+b\ln(cx^n))\sin(a+b\ln(cx^n))}{2(4b^4n^4+5b^2n^2+1)x^2} - \frac{3b^2n^2(\sin^2(a+b\ln(cx^n)))}{2(4b^4n^4+5b^2n^2+1)x^2} - \frac{bn\cos(a+b\ln(cx^n))(\sin^3(a+b\ln(cx^n)))}{(4b^2n^2+1)x^2} - \frac{\sin^4(a+b\ln(cx^n))}{2(4b^2n^2+1)x^2}$$

command

```
integrate(sin(a+b*ln(c*x**n))**4/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

69.3 Problem number 223

$$\int \frac{\cot^3(a + b\log(cx^n))}{x}\,dx$$

Optimal antiderivative

$$-\frac{\cot^2(a+b\ln(cx^n))}{2bn} - \frac{\ln(\sin(a+b\ln(cx^n)))}{bn}$$

command

```
integrate(cot(a+b*ln(c*x**n))**3/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty} \log(x) & \text{for}\: a = 0 \wedge b = 0 \wedge n = 0 \\ \log(x) \cot^3(a) & \text{for}\: b = 0 \\ \log(x) \cot^3(a + b\log(c)) & \text{for}\: n = 0 \\ \tilde{\infty} \log(x) & \text{for}\: a = -b\log(cx^n) \\ \frac{\log(\tan^2(a+b\log(cx^n))+1)}{2bn} - \frac{\log(\tan(a+b\log(cx^n)))}{bn} - \frac{1}{2bn\tan^2(a+b\log(cx^n))} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

69.4 Problem number 225

$$\int \frac{\cot^5(a + b\log(cx^n))}{x}\, dx$$

Optimal antiderivative

$$\frac{\cot^2(a + b\ln(c\,x^n))}{2bn} - \frac{\cot^4(a + b\ln(c\,x^n))}{4bn} + \frac{\ln(\sin(a + b\ln(c\,x^n)))}{bn}$$

command

```
integrate(cot(a+b*ln(c*x**n))**5/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty} \log(x) & \text{for}\: (a = 0 \vee a = - \\ \log(x) \cot^5(a) & \text{for}\: b = 0 \\ \log(x) \cot^5(a + b\log(c)) & \text{for}\: n = 0 \\ -\frac{\log(\tan^2(a+b\log(cx^n))+1)}{2bn} + \frac{\log(\tan(a+b\log(cx^n)))}{bn} + \frac{1}{2bn\tan^2(a+b\log(cx^n))} - \frac{1}{4bn\tan^4(a+b\log(cx^n))} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

70 Test file number 140

Test folder name:

`test_cases/4_Trig_functions/4.7_Miscellaneous/140_4.7.6_f^-a+b_x+c_x^2-trig-d+e_x+f_x^2-^n`

70.1 Problem number 43

$$\int e^{a+bx}\cos^2(c+dx)\sin^3(c+dx)\,dx$$

Optimal antiderivative

$$-\frac{d\,e^{bx+a}\cos(dx+c)}{8(b^2+d^2)}-\frac{3d\,e^{bx+a}\cos(3dx+3c)}{16(b^2+9d^2)}+\frac{5d\,e^{bx+a}\cos(5dx+5c)}{16(b^2+25d^2)}+\frac{b\,e^{bx+a}\sin(dx+c)}{8b^2+8d^2}+\frac{b\,e^{bx+a}\sin(3dx+3c)}{16b^2+144d^2}-\frac{b\,e^{bx+a}\sin(5dx+5c)}{16(b^2+25d^2)}$$

command

```
integrate(exp(b*x+a)*cos(d*x+c)**2*sin(d*x+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

70.2 Problem number 45

$$\int e^{a+bx}\cos^3(c+dx)\sin^2(c+dx)\,dx$$

Optimal antiderivative

$$\frac{b\,e^{bx+a}\cos(dx+c)}{8b^2+8d^2}-\frac{b\,e^{bx+a}\cos(3dx+3c)}{16(b^2+9d^2)}-\frac{b\,e^{bx+a}\cos(5dx+5c)}{16(b^2+25d^2)}+\frac{d\,e^{bx+a}\sin(dx+c)}{8b^2+8d^2}-\frac{3d\,e^{bx+a}\sin(3dx+3c)}{16(b^2+9d^2)}-\frac{5d\,e^{bx+a}\sin(5dx+5c)}{16(b^2+25d^2)}$$

command

```
integrate(exp(b*x+a)*cos(d*x+c)**3*sin(d*x+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

70.3 Problem number 46

$$\int e^{a+bx} \cos^3(c+dx) \sin^3(c+dx) \, dx$$

Optimal antiderivative

$$-\frac{3d\,\mathrm{e}^{bx+a} \cos(2dx+2c)}{16(b^2+4d^2)} + \frac{3d\,\mathrm{e}^{bx+a} \cos(6dx+6c)}{16(b^2+36d^2)} + \frac{3b\,\mathrm{e}^{bx+a} \sin(2dx+2c)}{32(b^2+4d^2)} - \frac{b\,\mathrm{e}^{bx+a} \sin(6dx+6c)}{32(b^2+36d^2)}$$

command

```
integrate(exp(b*x+a)*cos(d*x+c)**3*sin(d*x+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

71 Test file number 141

Test folder name:

`test_cases/4_Trig_functions/4.7_Miscellaneous/141_4.7.7_Trig_functions`

71.1 Problem number 211

$$\int \frac{a+b\cos^2(x)}{c+d\sin(x)} \, dx$$

Optimal antiderivative

$$\frac{bcx}{d^2} + \frac{b\cos(x)}{d} + \frac{2a \arctan\left(\frac{d+c\tan\left(\frac{x}{2}\right)}{\sqrt{c^2-d^2}}\right)}{\sqrt{c^2-d^2}} - \frac{2b \arctan\left(\frac{d+c\tan\left(\frac{x}{2}\right)}{\sqrt{c^2-d^2}}\right)\sqrt{c^2-d^2}}{d^2}$$

command

```
integrate((a+b*cos(x)**2)/(c+d*sin(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

71.2 Problem number 479

$$\int \frac{1}{b^2\cos^2(x)+\sin^2(x)}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{\tan(x)}{b}\right)}{b}$$

command

```
integrate(1/(b**2*cos(x)**2+sin(x)**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

71.3 Problem number 480

$$\int \frac{1}{b^2\cos^2(x)+a^2\sin^2(x)}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{a\tan(x)}{b}\right)}{ab}$$

command

```
integrate(1/(b**2*cos(x)**2+a**2*sin(x)**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

71.4 Problem number 704

$$\int \frac{\sec^2(x)\tan^2(x)}{\left(2+\tan^3(x)\right)^2}\,dx$$

Optimal antiderivative

$$-\frac{1}{3\left(2+\tan^3\left(x\right)\right)}$$

command

```
integrate(sec(x)**2*tan(x)**2/(2+tan(x)**3)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{1}{3\left(\tan^3\left(x\right)+2\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

71.5 Problem number 893

$$\int \left(-1+\sec^2(2x)\right)^3 \sin(2x)\,dx$$

Optimal antiderivative

$$\frac{\cos\left(2x\right)}{2}+\frac{3\sec\left(2x\right)}{2}-\frac{\left(\sec^3\left(2x\right)\right)}{2}+\frac{\left(\sec^5\left(2x\right)\right)}{10}$$

command

```
integrate((-1+sec(2*x)**2)**3*sin(2*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\cos\left(2x\right)}{2}-\frac{1}{2\left(2\cos^2\left(x\right)-1\right)^3}+\frac{1}{10\left(2\cos^2\left(x\right)-1\right)^5}+\frac{3}{4\left(\cos^2\left(x\right)-\frac{1}{2}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

71.6 Problem number 942

$$\int \frac{\cos^5(a+bx)-\sin^5(a+bx)}{\cos^5(a+bx)+\sin^5(a+bx)}\,dx$$

Optimal antiderivative

$$\frac{\ln(\cos(bx+a))}{b}+\frac{\ln(1+\tan(bx+a))}{5b} - \frac{4\ln\left(2-\left(-\sqrt{5}+1\right)\tan(bx+a)+2\left(\tan^2(bx+a)\right)\right)}{5b\left(-\sqrt{5}+1\right)} - \frac{4\ln\left(2-\left(\sqrt{5}+1\right)\tan(bx+a)+2\left(\tan^2(bx+a)\right)\right)}{5b\left(\sqrt{5}+1\right)}$$

command

```
integrate((cos(b*x+a)**5-sin(b*x+a)**5)/(cos(b*x+a)**5+sin(b*x+a)**5),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{47\log(\sin(a+bx)+\cos(a+bx))}{-235b+105\sqrt{5}\,b}+\frac{21\sqrt{5}\log(\sin(a+bx)+\cos(a+bx))}{-235b+105\sqrt{5}\,b}-\frac{26\sqrt{5}\log\left(16\sin^2(a+bx)-8\sin(a+bx)\cos(a+bx)+8\sqrt{5}\sin(a\right.}{-235b+105\sqrt{5}\,b} \\ \frac{x\left(-\sin^5(a)+\cos^5(a)\right)}{\sin^5(a)+\cos^5(a)} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

72 Test file number 144

Test folder name:

test_cases/5_Inverse_trig_functions/5.1_Inverse_sine/144_5.1.5_Inverse_sine_functions

72.1 Problem number 463

$$\int e^{\mathrm{ArcSin}(ax)}\left(1-a^2x^2\right)^{5/2}\,dx$$

Optimal antiderivative

$$\frac{144\,e^{\arcsin(ax)}}{629a}+\frac{72\,e^{\arcsin(ax)}\left(-a^2x^2+1\right)}{629a}+\frac{120\,e^{\arcsin(ax)}x\left(-a^2x^2+1\right)^{\frac{3}{2}}}{629} + \frac{30\,e^{\arcsin(ax)}\left(-a^2x^2+1\right)^2}{629a}+\frac{6\,e^{\arcsin(ax)}x\left(-a^2x^2+1\right)^{\frac{5}{2}}}{37} + \frac{e^{\arcsin(ax)}\left(-a^2x^2+1\right)^3}{37a}+\frac{144\,e^{\arcsin(ax)}x\sqrt{-a^2x^2+1}}{629}$$

command

```
integrate(exp(asin(a*x))*(-a**2*x**2+1)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^5x^6e^{\operatorname{asin}(ax)}}{37} + \frac{6a^4x^5\sqrt{-a^2x^2+1}\,e^{\operatorname{asin}(ax)}}{37} + \frac{81a^3x^4e^{\operatorname{asin}(ax)}}{629} - \frac{324a^2x^3\sqrt{-a^2x^2+1}\,e^{\operatorname{asin}(ax)}}{629} - \frac{183ax^2e^{\operatorname{asin}(ax)}}{629} + 366x\sqrt{} \\ x \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

73 Test file number 148

Test folder name:

`test_cases/5_Inverse_trig_functions/5.3_Inverse_tangent/148_5.3.2-d_x-^m-a+b_arctan-c_x^n-^p`

73.1 Problem number 96

$$\int x^{11}\left(a+b\mathrm{ArcTan}\left(cx^3\right)\right)\,dx$$

Optimal antiderivative

$$\frac{b\,x^3}{12c^3}-\frac{b\,x^9}{36c}-\frac{b\arctan\left(c\,x^3\right)}{12c^4}+\frac{x^{12}\left(a+b\arctan\left(c\,x^3\right)\right)}{12}$$

command

```
integrate(x**11*(a+b*atan(c*x**3)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{ax^{12}}{12} + \frac{bx^{12}\operatorname{atan}(cx^3)}{12} - \frac{bx^9}{36c} + \frac{bx^3}{12c^3} - \frac{b\operatorname{atan}(cx^3)}{12c^4} & \text{for } c \neq 0 \\ \frac{ax^{12}}{12} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

73.2 Problem number 103

$$\int \frac{a + b\text{ArcTan}(cx^3)}{x^{10}}\, dx$$

Optimal antiderivative

$$-\frac{bc}{18x^6} + \frac{-a - b\arctan(c\,x^3)}{9x^9} - \frac{b\,c^3\ln(x)}{3} + \frac{b\,c^3\ln(c^2x^6+1)}{18}$$

command

```
integrate((a+b*atan(c*x**3))/x**10,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a}{9x^9} - \frac{bc^4\sqrt{-\frac{1}{c^2}}\operatorname{atan}(cx^3)}{9} - \frac{bc^3\log(x)}{3} + \frac{bc^3\log\left(x - \sqrt[6]{-\frac{1}{c^2}}\right)}{9} + \frac{bc^3\log\left(4x^2 + 4x\sqrt[6]{-\frac{1}{c^2}} + 4\sqrt[3]{-\frac{1}{c^2}}\right)}{9} - \frac{bc}{18x^6} - \frac{b\operatorname{atan}(cx^3}{9x^9} \\ -\frac{a}{9x^9} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

73.3 Problem number 113

$$\int x^{11}\left(a + b\text{ArcTan}(cx^3)\right)^2\, dx$$

Optimal antiderivative

$$\frac{ab\,x^3}{6c^3} + \frac{b^2x^6}{36c^2} + \frac{b^2x^3\arctan(c\,x^3)}{6c^3} - \frac{b\,x^9(a + b\arctan(c\,x^3))}{18c} - \frac{(a + b\arctan(c\,x^3))^2}{12c^4} + \frac{x^{12}(a + b\arctan(c\,x^3))^2}{12} - \frac{b^2\ln(c^2x^6+1)}{9c^4}$$

command

```
integrate(x**11*(a+b*atan(c*x**3))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a^2x^{12}}{12} + \frac{abx^{12}\operatorname{atan}(cx^3)}{6} - \frac{abx^9}{18c} + \frac{abx^3}{6c^3} - \frac{ab\operatorname{atan}(cx^3)}{6c^4} + \frac{b^2x^{12}\operatorname{atan}^2(cx^3)}{12} - \frac{b^2x^9\operatorname{atan}(cx^3)}{18c} + \frac{b^2x^6}{36c^2} + \frac{b^2x^3\operatorname{atan}(cx^3)}{6c^3} + \frac{2b^2\sqrt{}}{} \\ \frac{a^2x^{12}}{12} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

74 Test file number 150

Test folder name:

`test_cases/5_Inverse_trig_functions/5.3_Inverse_tangent/150_5.3.4_u-a+b_arctan-c_x-^p`

74.1 Problem number 42

$$\int \frac{(d+icdx)^4(a+b\text{ArcTan}(cx))}{x^8}\,dx$$

Optimal antiderivative

$$-\frac{bc\,d^4}{42x^6}-\frac{2ib\,c^2d^4}{15x^5}+\frac{47b\,c^3d^4}{140x^4}+\frac{5ib\,c^4d^4}{9x^3}-\frac{88b\,c^5d^4}{105x^2}-\frac{5ib\,c^6d^4}{3x}-\frac{d^4(a+b\arctan(cx))}{7x^7}-\frac{2ic\,d^4(a+b\arctan(cx))}{3x^6}+\frac{6c^2d^4(a+b\arctan(cx))}{5x^5}+\frac{ic^3d^4(a+b\arctan(cx))}{x^4}-\frac{c^4d^4(a+b\arctan(cx))}{3x^3}-\frac{176b\,c^7d^4\ln(x)}{105}+\frac{b\,c^7d^4\ln(-cx+i)}{210}+\frac{117b\,c^7d^4\ln(cx+i)}{70}$$

command

```
integrate((d+I*c*d*x)**4*(a+b*atan(c*x))/x**8,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{176bc^7d^4\log(434427825b^2c^{15}d^8x)}{105}+\frac{bc^7d^4\log(434427825b^2c^{15}d^8x-434427825ib^2c^{14}d^8)}{210}+\frac{117bc^7d^4\log(434427825b^2c^{15}d^8x+434427825ib^2c^{14}d^8)}{70}+\frac{(-35ibc^4d^4x^4-105bc^3d^4x^3+126ibc^2d^4x^2+70bcd^4x-15ibd^4)\log(-icx+1)}{210x^7}+\frac{(35ibc^4d^4x^4+105bc^3d^4x^3-126ibc^2d^4x^2-70bcd^4x+15ibd^4)\log(icx+1)}{210x^7}+\frac{-180ad^4-2100ibc^6d^4x^6-1056bc^5d^4x^5+x^4(-420ac^4d^4+700ibc^4d^4)+x^3\cdot(1260iac^3d^4+423bc^3d^4)+x^2\cdot(15}{1260x^7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

74.2 Problem number 125

$$\int \frac{(a+b\text{ArcTan}(cx))^3}{(d+icdx)^3}\,dx$$

Optimal antiderivative

$$\frac{3b^3}{64c\,d^3\,(-cx+i)^2}-\frac{21ib^3}{64c\,d^3\,(-cx+i)}+\frac{21ib^3\arctan(cx)}{64c\,d^3}+\frac{3ib^2(a+b\arctan(cx))}{16c\,d^3\,(-cx+i)^2}+\frac{9b^2(a+b\arctan(cx))}{16c\,d^3\,(-cx+i)}-\frac{9b(a+b\arctan(cx))^2}{32c\,d^3}-\frac{3b(a+b\arctan(cx))^2}{8c\,d^3\,(-cx+i)^2}+\frac{3ib(a+b\arctan(cx))^2}{8c\,d^3\,(-cx+i)}-\frac{i(a+b\arctan(cx))^3}{8c\,d^3}+\frac{i(a+b\arctan(cx))^3}{2c\,d^3\,(icx+1)^2}$$

command

```
integrate((a+b*atan(c*x))**3/(d+I*c*d*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{3b(8a^2-12iab-7b^2)\log\left(-\frac{3ib(8a^2-12iab-7b^2)}{c}+x(24a^2b-36iab^2-21b^3)\right)}{128cd^3}+\frac{3b(8a^2-12iab-7b^2)\log\left(\frac{3ib(8a^2-12iab-7b^2)}{c}+x(24a^2b-36iab^2-21b^3)\right)}{128cd^3}+\frac{(-b^3c^2x^2+2ib^3cx-3b^3)\log(-icx+1)^3}{64c^3d^3x^2-128ic^2d^3x-64cd^3}+\frac{(b^3c^2x^2-2ib^3cx+3b^3)\log(icx+1)^3}{64c^3d^3x^2-128ic^2d^3x-64cd^3}+\frac{(12iab^2c^2x^2+24ab^2cx+36iab^2+9b^3c^2x^2-6ib^3cx+15b^3)\log(icx+1)^2}{128c^3d^3x^2-256ic^2d^3x-128cd^3}+\frac{(12iab^2c^2x^2+24ab^2cx+36iab^2+6b^3c^2x^2\log(icx+1)+9b^3c^2x^2-12ib^3cx\log(icx+1)-6ib^3cx+18b^3\log(ica}{128c^3d^3x^2-256ic^2d^3x-128cd^3}+\frac{-32ia^3-48a^2b+48iab^2+24b^3+x(-24ia^2bc-36ab^2c+21ib^3c)}{64c^3d^3x^2-128ic^2d^3x-64cd^3}+\frac{(48a^2b-12iab^2c^2x^2\log(icx+1)-24ab^2cx\log(icx+1)+24ab^2cx-36iab^2\log(icx+1)-48iab^2-3b^3c^2x^2\log}{}+\frac{(-24a^2b-12ab^2cx+24iab^2+9ib^3cx+12b^3)\log(icx+1)}{32c^3d^3x^2-64ic^2d^3x-32cd^3}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

74.3 Problem number 477

$$\int \frac{1}{(c+a^2cx^2)\operatorname{ArcTan}(ax)}\,dx$$

Optimal antiderivative

$$\frac{\ln(\arctan(ax))}{ac}$$

command

```
integrate(1/(a**2*c*x**2+c)/atan(a*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\log(\operatorname{atan}(ax))}{ac}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{\log(\operatorname{atan}(ax))}{ac} & \text{for } c \neq 0 \\ \tilde{\infty}\int \frac{1}{\operatorname{atan}(ax)}\,dx & \text{otherwise} \end{cases}$$

74.4 Problem number 546

$$\int \frac{1}{(c+a^2cx^2)\operatorname{ArcTan}(ax)^2}\,dx$$

Optimal antiderivative

$$-\frac{1}{ac\arctan(ax)}$$

command

```
integrate(1/(a**2*c*x**2+c)/atan(a*x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{1}{ac\operatorname{atan}(ax)}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} -\frac{1}{ac\operatorname{atan}(ax)} & \text{for } c \neq 0 \\ \tilde{\infty}\int \frac{1}{\operatorname{atan}^2(ax)}\,dx & \text{otherwise} \end{cases}$$

74.5 Problem number 622

$$\int \frac{1}{(c+a^2cx^2)\,\mathrm{ArcTan}(ax)^3}\,dx$$

Optimal antiderivative

$$-\frac{1}{2ac\arctan{(ax)}^2}$$

command

```
integrate(1/(a**2*c*x**2+c)/atan(a*x)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{1}{2ac\,\mathrm{atan}^2{(ax)}}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} -\frac{1}{2ac\,\mathrm{atan}^2{(ax)}} & \text{for}\ c \neq 0 \\ \tilde{\infty}\int\frac{1}{\mathrm{atan}^3{(ax)}}\,dx & \text{otherwise} \end{cases}$$

74.6 Problem number 859

$$\int \frac{\mathrm{ArcTan}(ax)^{5/2}}{c+a^2cx^2}\,dx$$

Optimal antiderivative

$$\frac{2\arctan{(ax)}^{\frac{7}{2}}}{7ac}$$

command

```
integrate(atan(a*x)**(5/2)/(a**2*c*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2\,\mathrm{atan}^{\frac{7}{2}}{(ax)}}{7ac} & \text{for}\ a \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{2\,\mathrm{atan}^{\frac{7}{2}}{(ax)}}{7ac} & \text{for}\ c \neq 0 \\ \tilde{\infty}\int\mathrm{atan}^{\frac{5}{2}}{(ax)}\,dx & \text{otherwise} \end{cases}$$

74.7 Problem number 928

$$\int \frac{1}{(c+a^2cx^2)\sqrt{\mathrm{ArcTan}(ax)}}\,dx$$

Optimal antiderivative

$$\frac{2\sqrt{\arctan(ax)}}{ac}$$

command

```
integrate(1/(a**2*c*x**2+c)/atan(a*x)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2\sqrt{\operatorname{atan}(ax)}}{ac}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{2\sqrt{\operatorname{atan}(ax)}}{ac} & \text{for } c \neq 0 \\ \tilde{\infty}\int \frac{1}{\sqrt{\operatorname{atan}(ax)}}\,dx & \text{otherwise} \end{cases}$$

74.8 Problem number 986

$$\int \frac{1}{(c+a^2cx^2)\,\mathrm{ArcTan}(ax)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2}{ac\sqrt{\arctan(ax)}}$$

command

```
integrate(1/(a**2*c*x**2+c)/atan(a*x)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2}{ac\sqrt{\operatorname{atan}(ax)}}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} -\frac{2}{ac\sqrt{\operatorname{atan}(ax)}} & \text{for } c \neq 0 \\ \tilde{\infty}\int \frac{1}{\operatorname{atan}^{\frac{3}{2}}(ax)}\,dx & \text{otherwise} \end{cases}$$

74.9 Problem number 1056

$$\int \frac{1}{(c+a^2cx^2)\operatorname{ArcTan}(ax)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2}{3ac\arctan(ax)^{\frac{3}{2}}}$$

command

```
integrate(1/(a**2*c*x**2+c)/atan(a*x)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2}{3ac\operatorname{atan}^{\frac{3}{2}}(ax)}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} -\frac{2}{3ac\operatorname{atan}^{\frac{3}{2}}(ax)} & \text{for } c \neq 0 \\ \tilde{\infty}\int \frac{1}{\operatorname{atan}^{\frac{5}{2}}(ax)}\,dx & \text{otherwise} \end{cases}$$

74.10 Problem number 1159

$$\int \frac{x(a+b\operatorname{ArcTan}(cx))}{(d+ex^2)^2}\,dx$$

Optimal antiderivative

$$\frac{b\,c^2\arctan(cx)}{2(c^2d-e)\,e}+\frac{-a-b\arctan(cx)}{2e(e\,x^2+d)}-\frac{bc\arctan\left(\frac{x\sqrt{e}}{\sqrt{d}}\right)}{2(c^2d-e)\sqrt{d}\,\sqrt{e}}$$

command

```
integrate(x*(a+b*atan(c*x))/(e*x**2+d)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\frac{ax^2}{2}+\frac{bx^2\operatorname{atan}(cx)}{2}-\frac{bx}{2c}+\frac{b\operatorname{atan}(cx)}{2c^2}}{d^2} \\ -\frac{2ad}{4d^2e+4de^2x^2}-\frac{bdx\sqrt{\frac{e}{d}}}{4d^2e+4de^2x^2}+\frac{bd\operatorname{atan}\left(x\sqrt{\frac{e}{d}}\right)}{4d^2e+4de^2x^2}-\frac{bex^2\operatorname{atan}\left(x\sqrt{\frac{e}{d}}\right)}{4d^2e+4de^2x^2} \\ -\frac{2ad}{4d^2e+4de^2x^2}+\frac{bdx\sqrt{\frac{e}{d}}}{4d^2e+4de^2x^2}-\frac{bd\operatorname{atan}\left(x\sqrt{\frac{e}{d}}\right)}{4d^2e+4de^2x^2}+\frac{bex^2\operatorname{atan}\left(x\sqrt{\frac{e}{d}}\right)}{4d^2e+4de^2x^2} \\ \frac{-\frac{a}{2x^2}-\frac{bc^2\operatorname{atan}(cx)}{2}-\frac{bc}{2x}-\frac{b\operatorname{atan}(cx)}{2x^2}}{e^2} \\ -\frac{2ac^2d\sqrt{-\frac{d}{e}}}{4c^2d^2e\sqrt{-\frac{d}{e}}+4c^2de^2x^2\sqrt{-\frac{d}{e}}-4de^2\sqrt{-\frac{d}{e}}-4e^3x^2\sqrt{-\frac{d}{e}}}+\frac{2ae\sqrt{-\frac{d}{e}}}{4c^2d^2e\sqrt{-\frac{d}{e}}+4c^2de^2x^2\sqrt{-\frac{d}{e}}-4de^2\sqrt{-\frac{d}{e}}-4e^3x^2\sqrt{-\frac{d}{e}}}+ - \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

75 Test file number 152

Test folder name:

test_cases/5_Inverse_trig_functions/5.3_Inverse_tangent/152_5.3.6_Exponentials_of_inverse_tan

75.1 Problem number 248

$$\int \frac{e^{\text{ArcTan}(ax)}}{c+a^2cx^2}\,dx$$

Optimal antiderivative

$$\frac{e^{\arctan(ax)}}{ac}$$

command

integrate(exp(atan(a*x))/(a2*c*x**2+c),x)**

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{e^{\operatorname{atan}(ax)}}{ac} & \text{for } a \neq 0 \\ \frac{x}{c} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{e^{\operatorname{atan}(ax)}}{ac} & \text{for } c \neq 0 \\ \tilde{\infty}\int e^{\operatorname{atan}(ax)}\,dx & \text{otherwise} \end{cases}$$

75.2 Problem number 249

$$\int \frac{e^{\text{ArcTan}(ax)}}{(c+a^2cx^2)^2}\,dx$$

Optimal antiderivative

$$\frac{2\,\mathrm{e}^{\arctan(ax)}}{5a\,c^2}+\frac{\mathrm{e}^{\arctan(ax)}(2ax+1)}{5a\,c^2\,(a^2x^2+1)}$$

command

```
integrate(exp(atan(a*x))/(a**2*c*x**2+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2a^2x^2e^{\operatorname{atan}(ax)}}{5a^3c^2x^2+5ac^2}+\frac{2axe^{\operatorname{atan}(ax)}}{5a^3c^2x^2+5ac^2}+\frac{3e^{\operatorname{atan}(ax)}}{5a^3c^2x^2+5ac^2} & \text{for } a\neq 0 \\ \frac{x}{c^2} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{2a^2x^2e^{\operatorname{atan}(ax)}}{5a^3c^2x^2+5ac^2}+\frac{2axe^{\operatorname{atan}(ax)}}{5a^3c^2x^2+5ac^2}+\frac{3e^{\operatorname{atan}(ax)}}{5a^3c^2x^2+5ac^2} & \text{for } c\neq 0 \\ \tilde{\infty}\int e^{\operatorname{atan}(ax)}\,dx & \text{otherwise} \end{cases}$$

75.3 Problem number 250

$$\int \frac{e^{\text{ArcTan}(ax)}}{(c+a^2cx^2)^3}\,dx$$

Optimal antiderivative

$$\frac{24\,\mathrm{e}^{\arctan(ax)}}{85a\,c^3}+\frac{\mathrm{e}^{\arctan(ax)}(4ax+1)}{17a\,c^3\,(a^2x^2+1)^2}+\frac{12\,\mathrm{e}^{\arctan(ax)}(2ax+1)}{85a\,c^3\,(a^2x^2+1)}$$

command

```
integrate(exp(atan(a*x))/(a**2*c*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{24a^4x^4e^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{24a^3x^3e^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{60a^2x^2e^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{44axe^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{4}{85a^5c^3x^4} \\ \frac{x}{c^3} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{24a^4x^4e^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{24a^3x^3e^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{60a^2x^2e^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{44axe^{\operatorname{atan}(ax)}}{85a^5c^3x^4+170a^3c^3x^2+85ac^3}+\frac{4}{85a^5c^3x^4} \\ \tilde{\infty}\int e^{\operatorname{atan}(ax)}\,dx \end{cases}$$

75.4 Problem number 251

$$\int \frac{e^{\text{ArcTan}(ax)}}{\left(c+a^2cx^2\right)^4}\,dx$$

Optimal antiderivative

$$\frac{144\,\mathrm{e}^{\arctan(ax)}}{629a\,c^4}+\frac{\mathrm{e}^{\arctan(ax)}(6ax+1)}{37a\,c^4\,(a^2x^2+1)^3}+\frac{30\,\mathrm{e}^{\arctan(ax)}(4ax+1)}{629a\,c^4\,(a^2x^2+1)^2}+\frac{72\,\mathrm{e}^{\arctan(ax)}(2ax+1)}{629a\,c^4\,(a^2x^2+1)}$$

command

```
integrate(exp(atan(a*x))/(a**2*c*x**2+c)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{144a^6x^6e^{\operatorname{atan}(ax)}}{629a^7c^4x^6+1887a^5c^4x^4+1887a^3c^4x^2+629ac^4}+\frac{144a^5x^5e^{\operatorname{atan}(ax)}}{629a^7c^4x^6+1887a^5c^4x^4+1887a^3c^4x^2+629ac^4}+\frac{504a^4x^4e^{\operatorname{atan}(ax)}}{629a^7c^4x^6+1887a^5c^4x^4+1887a^3c^4x^2+629}\\ \frac{x}{c^4}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases}\frac{144a^6x^6e^{\operatorname{atan}(ax)}}{629a^7c^4x^6+1887a^5c^4x^4+1887a^3c^4x^2+629ac^4}+\frac{144a^5x^5e^{\operatorname{atan}(ax)}}{629a^7c^4x^6+1887a^5c^4x^4+1887a^3c^4x^2+629ac^4}+\frac{504a^4x^4e^{\operatorname{atan}(ax)}}{629a^7c^4x^6+1887a^5c^4x^4+1887a^3c^4x^2+629}\\ \tilde{\infty}\int e^{\operatorname{atan}(ax)}\,dx\end{cases}$$

75.5 Problem number 252

$$\int \frac{e^{\text{ArcTan}(ax)}}{\left(c+a^2cx^2\right)^5}\,dx$$

Optimal antiderivative

$$\frac{8064\,\mathrm{e}^{\arctan(ax)}}{40885a\,c^5}+\frac{\mathrm{e}^{\arctan(ax)}(8ax+1)}{65a\,c^5\,(a^2x^2+1)^4}+\frac{56\,\mathrm{e}^{\arctan(ax)}(6ax+1)}{2405a\,c^5\,(a^2x^2+1)^3}+\frac{336\,\mathrm{e}^{\arctan(ax)}(4ax+1)}{8177a\,c^5\,(a^2x^2+1)^2}+\frac{4032\,\mathrm{e}^{\arctan(ax)}(2ax+1)}{40885a\,c^5\,(a^2x^2+1)}$$

command

```
integrate(exp(atan(a*x))/(a**2*c*x**2+c)**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{8064a^8x^8e^{\operatorname{atan}(ax)}}{40885a^9c^5x^8+163540a^7c^5x^6+245310a^5c^5x^4+163540a^3c^5x^2+40885ac^5} + \frac{8064a^7x^7e^{\operatorname{atan}(ax)}}{40885a^9c^5x^8+163540a^7c^5x^6+245310a^5c^5x^4+163540a^3c^5x^2+40885ac^5} \\ \frac{x}{c^5} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{8064a^8x^8e^{\operatorname{atan}(ax)}}{40885a^9c^5x^8+163540a^7c^5x^6+245310a^5c^5x^4+163540a^3c^5x^2+40885ac^5} + \frac{8064a^7x^7e^{\operatorname{atan}(ax)}}{40885a^9c^5x^8+163540a^7c^5x^6+245310a^5c^5x^4+163540a^3c^5x^2+40885ac^5} \\ \tilde{\infty}\int e^{\operatorname{atan}(ax)}\,dx \end{cases}$$

75.6 Problem number 263

$$\int \frac{e^{2\operatorname{ArcTan}(ax)}}{c+a^2cx^2}\,dx$$

Optimal antiderivative

$$\frac{e^{2\arctan(ax)}}{2ac}$$

command

```
integrate(exp(2*atan(a*x))/(a**2*c*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{e^{2\operatorname{atan}(ax)}}{2ac} & \text{for } a \neq 0 \\ \frac{x}{c} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{e^{2\operatorname{atan}(ax)}}{2ac} & \text{for } c \neq 0 \\ \tilde{\infty}\int e^{2\operatorname{atan}(ax)}\,dx & \text{otherwise} \end{cases}$$

75.7 Problem number 264

$$\int \frac{e^{2\operatorname{ArcTan}(ax)}}{(c+a^2cx^2)^2}\,dx$$

Optimal antiderivative

$$\frac{e^{2\arctan(ax)}}{8a\,c^2} + \frac{e^{2\arctan(ax)}(ax+1)}{4a\,c^2\,(a^2x^2+1)}$$

command

```
integrate(exp(2*atan(a*x))/(a**2*c*x**2+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a^2x^2e^{2\operatorname{atan}(ax)}}{8a^3c^2x^2+8ac^2} + \frac{2axe^{2\operatorname{atan}(ax)}}{8a^3c^2x^2+8ac^2} + \frac{3e^{2\operatorname{atan}(ax)}}{8a^3c^2x^2+8ac^2} & \text{for } a \neq 0 \\ \frac{x}{c^2} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{a^2x^2e^{2\operatorname{atan}(ax)}}{8a^3c^2x^2+8ac^2} + \frac{2axe^{2\operatorname{atan}(ax)}}{8a^3c^2x^2+8ac^2} + \frac{3e^{2\operatorname{atan}(ax)}}{8a^3c^2x^2+8ac^2} & \text{for } c \neq 0 \\ \tilde{\infty}\int e^{2\operatorname{atan}(ax)}\,dx & \text{otherwise} \end{cases}$$

75.8 Problem number 265

$$\int \frac{e^{2\operatorname{ArcTan}(ax)}}{(c+a^2cx^2)^3}\,dx$$

Optimal antiderivative

$$\frac{3\,\mathrm{e}^{2\arctan(ax)}}{40a\,c^3} + \frac{\mathrm{e}^{2\arctan(ax)}(2ax+1)}{10a\,c^3\,(a^2x^2+1)^2} + \frac{3\,\mathrm{e}^{2\arctan(ax)}(ax+1)}{20a\,c^3\,(a^2x^2+1)}$$

command

```
integrate(exp(2*atan(a*x))/(a**2*c*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{3a^4x^4e^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{6a^3x^3e^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{12a^2x^2e^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{14axe^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{13e^{2\operatorname{ata}}}{40a^5c^3x^4+80a} \\ \frac{x}{c^3} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \frac{3a^4x^4e^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{6a^3x^3e^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{12a^2x^2e^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{14axe^{2\operatorname{atan}(ax)}}{40a^5c^3x^4+80a^3c^3x^2+40ac^3} + \frac{13e^{2\operatorname{ata}}}{40a^5c^3x^4+80a} \\ \tilde{\infty}\int e^{2\operatorname{atan}(ax)}\,dx \end{cases}$$

75.9 Problem number 266

$$\int \frac{e^{2\text{ArcTan}(ax)}}{(c+a^2cx^2)^4}\,dx$$

Optimal antiderivative

$$\frac{9\,\mathrm{e}^{2\arctan(ax)}}{160a\,c^4}+\frac{\mathrm{e}^{2\arctan(ax)}(3ax+1)}{20a\,c^4\,(a^2x^2+1)^3}+\frac{3\,\mathrm{e}^{2\arctan(ax)}(2ax+1)}{40a\,c^4\,(a^2x^2+1)^2}+\frac{9\,\mathrm{e}^{2\arctan(ax)}(ax+1)}{80a\,c^4\,(a^2x^2+1)}$$

command

```
integrate(exp(2*atan(a*x))/(a**2*c*x**2+c)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{9a^6x^6e^{2\operatorname{atan}(ax)}}{160a^7c^4x^6+480a^5c^4x^4+480a^3c^4x^2+160ac^4}+\frac{18a^5x^5e^{2\operatorname{atan}(ax)}}{160a^7c^4x^6+480a^5c^4x^4+480a^3c^4x^2+160ac^4}+\frac{45a^4x^4e^{2\operatorname{atan}(ax)}}{160a^7c^4x^6+480a^5c^4x^4+480a^3c^4x^2+160ac^4}+ \\ \frac{x}{c^4}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases}\frac{9a^6x^6e^{2\operatorname{atan}(ax)}}{160a^7c^4x^6+480a^5c^4x^4+480a^3c^4x^2+160ac^4}+\frac{18a^5x^5e^{2\operatorname{atan}(ax)}}{160a^7c^4x^6+480a^5c^4x^4+480a^3c^4x^2+160ac^4}+\frac{45a^4x^4e^{2\operatorname{atan}(ax)}}{160a^7c^4x^6+480a^5c^4x^4+480a^3c^4x^2+160ac^4}+ \\ \tilde{\infty}\int e^{2\operatorname{atan}(ax)}\,dx\end{cases}$$

75.10 Problem number 277

$$\int \frac{e^{-\text{ArcTan}(ax)}}{c+a^2cx^2}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{-\arctan(ax)}}{ac}$$

command

```
integrate(1/exp(atan(a*x))/(a**2*c*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{e^{-\operatorname{atan}(ax)}}{ac} & \text{for } a\neq 0\\ \frac{x}{c} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases}-\frac{e^{-\operatorname{atan}(ax)}}{ac} & \text{for } c\neq 0\\ \tilde{\infty}\int e^{-\operatorname{atan}(ax)}\,dx & \text{otherwise}\end{cases}$$

75.11 Problem number 278

$$\int \frac{e^{-\text{ArcTan}(ax)}}{(c+a^2cx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{2\,\mathrm{e}^{-\arctan(ax)}}{5a\,c^2}+\frac{(2ax-1)\,\mathrm{e}^{-\arctan(ax)}}{5a\,c^2\,(a^2x^2+1)}$$

command

```
integrate(1/exp(atan(a*x))/(a**2*c*x**2+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2a^2x^2}{5a^3c^2x^2e^{\operatorname{atan}(ax)}+5ac^2e^{\operatorname{atan}(ax)}}+\frac{2ax}{5a^3c^2x^2e^{\operatorname{atan}(ax)}+5ac^2e^{\operatorname{atan}(ax)}}-\frac{3}{5a^3c^2x^2e^{\operatorname{atan}(ax)}+5ac^2e^{\operatorname{atan}(ax)}} & \text{for } a\neq 0\\ \frac{x}{c^2} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} -\frac{2a^2x^2}{5a^3c^2x^2e^{\operatorname{atan}(ax)}+5ac^2e^{\operatorname{atan}(ax)}}+\frac{2ax}{5a^3c^2x^2e^{\operatorname{atan}(ax)}+5ac^2e^{\operatorname{atan}(ax)}}-\frac{3}{5a^3c^2x^2e^{\operatorname{atan}(ax)}+5ac^2e^{\operatorname{atan}(ax)}} & \text{for } c\neq 0\\ \tilde{\infty}\int e^{-\operatorname{atan}(ax)}\,dx & \text{otherwise}\end{cases}$$

75.12 Problem number 279

$$\int \frac{e^{-\text{ArcTan}(ax)}}{(c+a^2cx^2)^3}\,dx$$

Optimal antiderivative

$$-\frac{24\,\mathrm{e}^{-\arctan(ax)}}{85a\,c^3}+\frac{(4ax-1)\,\mathrm{e}^{-\arctan(ax)}}{17a\,c^3\,(a^2x^2+1)^2}-\frac{12(-2ax+1)\,\mathrm{e}^{-\arctan(ax)}}{85a\,c^3\,(a^2x^2+1)}$$

command

```
integrate(1/exp(atan(a*x))/(a**2*c*x**2+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{24a^4x^4}{85a^5c^3x^4e^{\operatorname{atan}(ax)}+170a^3c^3x^2e^{\operatorname{atan}(ax)}+85ac^3e^{\operatorname{atan}(ax)}}+\frac{24a^3x^3}{85a^5c^3x^4e^{\operatorname{atan}(ax)}+170a^3c^3x^2e^{\operatorname{atan}(ax)}+85ac^3e^{\operatorname{atan}(ax)}}-\frac{}{85a^5c^3x^4e^{\operatorname{atan}(ax)}} \\ \frac{x}{c^3} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

75.13 Problem number 291

$$\int \frac{e^{-2\text{ArcTan}(ax)}}{c+a^2cx^2}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{-2\arctan(ax)}}{2ac}$$

command

`integrate(1/exp(2*atan(a*x))/(a**2*c*x**2+c),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{e^{-2\operatorname{atan}(ax)}}{2ac} & \text{for } a \neq 0 \\ \frac{x}{c} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} -\frac{e^{-2\operatorname{atan}(ax)}}{2ac} & \text{for } c \neq 0 \\ \tilde{\infty} \int e^{-2\operatorname{atan}(ax)}\,dx & \text{otherwise} \end{cases}$$

75.14 Problem number 292

$$\int \frac{e^{-2\text{ArcTan}(ax)}}{(c+a^2cx^2)^2}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{-2\arctan(ax)}}{8a\,c^2}+\frac{(ax-1)\,\mathrm{e}^{-2\arctan(ax)}}{4a\,c^2\,(a^2x^2+1)}$$

command

`integrate(1/exp(2*atan(a*x))/(a**2*c*x**2+c)**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^2x^2}{8a^3c^2x^2e^{2\operatorname{atan}(ax)}+8ac^2e^{2\operatorname{atan}(ax)}}+\frac{2ax}{8a^3c^2x^2e^{2\operatorname{atan}(ax)}+8ac^2e^{2\operatorname{atan}(ax)}}-\frac{3}{8a^3c^2x^2e^{2\operatorname{atan}(ax)}+8ac^2e^{2\operatorname{atan}(ax)}} & \text{for } a \neq 0 \\ \frac{x}{c^2} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} -\frac{a^2x^2}{8a^3c^2x^2e^{2\operatorname{atan}(ax)}+8ac^2e^{2\operatorname{atan}(ax)}}+\frac{2ax}{8a^3c^2x^2e^{2\operatorname{atan}(ax)}+8ac^2e^{2\operatorname{atan}(ax)}}-\frac{3}{8a^3c^2x^2e^{2\operatorname{atan}(ax)}+8ac^2e^{2\operatorname{atan}(ax)}} & \text{for } c \neq 0 \\ \tilde{\infty} \int e^{-2\operatorname{atan}(ax)}\,dx & \text{otherwise} \end{cases}$$

75.15 Problem number 343

$$\int \frac{e^{n\text{ArcTan}(ax)}}{c+a^2cx^2}\,dx$$

Optimal antiderivative

$$\frac{e^{n\arctan(ax)}}{acn}$$

command

`integrate(exp(n*atan(a*x))/(a**2*c*x**2+c),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{x}{c} & \text{for}\ a=0\wedge n=0 \\ \frac{\operatorname{atan}(ax)}{ac} & \text{for}\ n=0 \\ \frac{x}{c} & \text{for}\ a=0 \\ \frac{e^{n\operatorname{atan}(ax)}}{acn} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \tilde{\infty}x & \text{for}\ c=0\wedge n=0 \\ \tilde{\infty}\int e^{n\operatorname{atan}(ax)}\,dx & \text{for}\ c=0 \\ \frac{\operatorname{atan}(ax)}{ac} & \text{for}\ n=0 \\ \frac{e^{n\operatorname{atan}(ax)}}{acn} & \text{otherwise} \end{cases}$$

76 Test file number 153

Test folder name:

`test_cases/5_Inverse_trig_functions/5.3_Inverse_tangent/153_5.3.7_Inverse_tangent_functions`

76.1 Problem number 127

$$\int -x^2\text{ArcTan}\left(\sqrt{x}-\sqrt{1+x}\right)\,dx$$

Optimal antiderivative

$$-\frac{x^{\frac{3}{2}}}{18}+\frac{x^{\frac{5}{2}}}{30}+\frac{\pi x^3}{12}-\frac{\arctan\left(\sqrt{x}\right)}{6}-\frac{x^3\arctan\left(\sqrt{x}\right)}{6}+\frac{\sqrt{x}}{6}$$

command

```
integrate(-x**2*atan(x**(1/2)-(1+x)**(1/2)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{x^{\frac{5}{2}}}{30} - \frac{x^{\frac{3}{2}}}{18} + \frac{\sqrt{x}}{6} - \frac{x^3 \operatorname{atan}\left(\sqrt{x} - \sqrt{x+1}\right)}{3} - \frac{\operatorname{atan}\left(\sqrt{x}\right)}{6}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

76.2 Problem number 132

$$\int -\frac{\operatorname{ArcTan}\left(\sqrt{x} - \sqrt{1+x}\right)}{x^3}\, dx$$

Optimal antiderivative

$$-\frac{\pi}{8x^2} + \frac{1}{12x^{\frac{3}{2}}} - \frac{\arctan\left(\sqrt{x}\right)}{4} + \frac{\arctan\left(\sqrt{x}\right)}{4x^2} - \frac{1}{4\sqrt{x}}$$

command

```
integrate(-atan(x**(1/2)-(1+x)**(1/2))/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{6x^{\frac{7}{2}}\sqrt{x+1}\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} - \frac{3x^{\frac{7}{2}}}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} + \frac{6x^{\frac{5}{2}}\sqrt{x+1}\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} - \frac{2x^{\frac{5}{2}}}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} - \frac{6x^{\frac{3}{2}}\sqrt{x+1}\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} + \frac{x^{\frac{3}{2}}}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} - \frac{6\sqrt{x}\sqrt{x+1}\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} - \frac{6x^4\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} + \frac{3x^3\sqrt{x+1}}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} - \frac{6x^3\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} + \frac{2x^2\sqrt{x+1}}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} + \frac{6x^2\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} - \frac{x\sqrt{x+1}}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3} + \frac{6x\operatorname{atan}\left(\sqrt{x}-\sqrt{x+1}\right)}{-12x^{\frac{7}{2}}\sqrt{x+1}-12x^{\frac{5}{2}}\sqrt{x+1}+12x^4+12x^3}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

77 Test file number 160

Test folder name:

`test_cases/6_Hyperbolic_functions/6.1_Hyperbolic_sine/160_6.1.1-c+d_x-^m-a+b_sinh-^n`

77.1 Problem number 231

$$\int \frac{\sinh^2(c+dx)}{a+b\sinh(c+dx)}\,dx$$

Optimal antiderivative

$$-\frac{ax}{b^2}+\frac{\cosh\left(dx+c\right)}{bd}-\frac{2a^2\,\mathrm{arctanh}\left(\frac{b-a\tanh\left(\frac{dx}{2}+\frac{c}{2}\right)}{\sqrt{a^2+b^2}}\right)}{b^2d\sqrt{a^2+b^2}}$$

command

```
integrate(sinh(d*x+c)**2/(a+b*sinh(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

78 Test file number 163

Test folder name:

`test_cases/6_Hyperbolic_functions/6.1_Hyperbolic_sine/163_6.1.5_Hyperbolic_sine_functions`

78.1 Problem number 74

$$\int \frac{\sinh^2(x)}{a+b\sinh(x)}\,dx$$

Optimal antiderivative

$$-\frac{ax}{b^2}+\frac{\cosh\left(x\right)}{b}-\frac{2a^2\,\mathrm{arctanh}\left(\frac{b-a\tanh\left(\frac{x}{2}\right)}{\sqrt{a^2+b^2}}\right)}{b^2\sqrt{a^2+b^2}}$$

command

```
integrate(sinh(x)**2/(a+b*sinh(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

78.2 Problem number 92

$$\int \frac{1}{5+3i\sinh(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{x}{4}-\frac{i\arctan\left(\frac{\cosh(dx+c)}{3+i\sinh(dx+c)}\right)}{2d}$$

command

```
integrate(1/(5+3*I*sinh(d*x+c)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{-\frac{\log\left(e^{dx}-3ie^{-c}\right)}{4}+\frac{\log\left(e^{dx}-\frac{ie^{-c}}{3}\right)}{4}}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

78.3 Problem number 93

$$\int \frac{1}{(5+3i\sinh(c+dx))^2}\,dx$$

Optimal antiderivative

$$\frac{5x}{64}-\frac{5i\arctan\left(\frac{\cosh(dx+c)}{3+i\sinh(dx+c)}\right)}{32d}-\frac{3i\cosh\left(dx+c\right)}{16d\left(5+3i\sinh\left(dx+c\right)\right)}$$

command

```
integrate(1/(5+3*I*sinh(d*x+c))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{-5ie^{c}e^{dx}-3}{24de^{2c}e^{2dx}-80ide^{c}e^{dx}-24d}+\frac{-\frac{5\log\left(e^{dx}-3ie^{-c}\right)}{64}+\frac{5\log\left(e^{dx}-\frac{ie^{-c}}{3}\right)}{64}}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

78.4 Problem number 94

$$\int\frac{1}{(5+3i\sinh(c+dx))^{3}}\,dx$$

Optimal antiderivative

$$\frac{59x}{2048}-\frac{59i\arctan\left(\frac{\cosh(dx+c)}{3+i\sinh(dx+c)}\right)}{1024d}-\frac{3i\cosh\left(dx+c\right)}{32d\left(5+3i\sinh\left(dx+c\right)\right)^{2}}-\frac{45i\cosh\left(dx+c\right)}{512d\left(5+3i\sinh\left(dx+c\right)\right)}$$

command

```
integrate(1/(5+3*I*sinh(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{-177ie^{3c}e^{3dx}-885e^{2c}e^{2dx}+723ie^{c}e^{dx}+135}{2304de^{4c}e^{4dx}-15360ide^{3c}e^{3dx}-30208de^{2c}e^{2dx}+15360ide^{c}e^{dx}+2304d}+\frac{-\frac{59\log\left(e^{dx}-3ie^{-c}\right)}{2048}+\frac{59\log\left(e^{dx}-\frac{ie^{-c}}{3}\right)}{2048}}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

78.5 Problem number 95

$$\int\frac{1}{(5+3i\sinh(c+dx))^{4}}\,dx$$

Optimal antiderivative

$$\frac{385x}{32768} - \frac{385i \arctan\left(\frac{\cosh(dx+c)}{3+i\sinh(dx+c)}\right)}{16384d} - \frac{i\cosh(dx+c)}{16d\left(5+3i\sinh(dx+c)\right)^3} - \frac{25i\cosh(dx+c)}{512d\left(5+3i\sinh(dx+c)\right)^2} - \frac{311i\cosh(dx+c)}{8192d\left(5+3i\sinh(dx+c)\right)}$$

command

```
integrate(1/(5+3*I*sinh(d*x+c))**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{-10395ie^{5c}e^{5dx} - 86625e^{4c}e^{4dx} + 239470ie^{3c}e^{3dx} + 218466e^{2c}e^{2dx} - 73575ie^{c}e^{dx} - 8397}{331776de^{6c}e^{6dx} - 3317760ide^{5c}e^{5dx} - 12054528de^{4c}e^{4dx} + 18923520ide^{3c}e^{3dx} + 12054528de^{2c}e^{2dx} - 3317760ide^{c}e^{d}} + \frac{-\frac{385\log\left(e^{dx}-3ie^{-c}\right)}{32768} + \frac{385\log\left(e^{dx}-\frac{ie^{-c}}{3}\right)}{32768}}{d}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: NotInvertible

79 Test file number 164

Test folder name:

`test_cases/6_Hyperbolic_functions/6.1_Hyperbolic_sine/164_6.1.7_hyper^m-a+b_sinh^n-^p`

79.1 Problem number 34

$$\int \frac{\sinh(c+dx)}{a+b\sinh^2(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{\cosh(dx+c)\sqrt{b}}{\sqrt{a-b}}\right)}{d\sqrt{a-b}\,\sqrt{b}}$$

command

```
integrate(sinh(d*x+c)/(a+b*sinh(d*x+c)**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

79.2 Problem number 35

$$\int \frac{1}{a+b\sinh^2(c+dx)}\,dx$$

Optimal antiderivative

$$\frac{\operatorname{arctanh}\left(\frac{\sqrt{a-b}\,\tanh(dx+c)}{\sqrt{a}}\right)}{d\sqrt{a}\,\sqrt{a-b}}$$

command

```
integrate(1/(a+b*sinh(d*x+c)**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

79.3 Problem number 182

$$\int \frac{1}{1+\sinh^3(x)}\,dx$$

Optimal antiderivative

$$-\frac{(-1)^{\frac{1}{6}}\ln\left(1+(-1)^{\frac{5}{6}}-(-1)^{\frac{1}{6}}\tanh\left(\frac{x}{2}\right)\right)}{3}+\frac{(-1)^{\frac{1}{6}}\ln\left(1+(-1)^{\frac{1}{6}}+(-1)^{\frac{1}{3}}\tanh\left(\frac{x}{2}\right)\right)}{3}$$
$$-\frac{\operatorname{arctanh}\left(\frac{\left(1-\tanh\left(\frac{x}{2}\right)\right)\sqrt{2}}{2}\right)\sqrt{2}}{3}-\frac{2(-1)^{\frac{1}{6}}\arctan\left(\frac{i+(-1)^{\frac{1}{6}}\tanh\left(\frac{x}{2}\right)}{\sqrt{1-(-1)^{\frac{1}{3}}}}\right)}{3\sqrt{1-(-1)^{\frac{1}{3}}}}$$

command

```
integrate(1/(1+sinh(x)**3),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

79.4 Problem number 183

$$\int \frac{1}{1-\sinh^3(x)}\,dx$$

Optimal antiderivative

$$-\frac{(-1)^{\frac{5}{6}}\ln\left(1+(-1)^{\frac{5}{6}}+(-1)^{\frac{2}{3}}\tanh\left(\frac{x}{2}\right)\right)}{3}+\frac{(-1)^{\frac{5}{6}}\ln\left(1+(-1)^{\frac{1}{6}}+(-1)^{\frac{5}{6}}\tanh\left(\frac{x}{2}\right)\right)}{3}$$
$$+\frac{\operatorname{arctanh}\left(\frac{(1+\tanh(\frac{x}{2}))\sqrt{2}}{2}\right)\sqrt{2}}{3}+\frac{2(-1)^{\frac{5}{6}}\arctan\left(\frac{i-(-1)^{\frac{5}{6}}\tanh(\frac{x}{2})}{\sqrt{1+(-1)^{\frac{2}{3}}}}\right)}{3\sqrt{1+(-1)^{\frac{2}{3}}}}$$

command

```
integrate(1/(1-sinh(x)**3),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

79.5 Problem number 207

$$\int \sinh^5(c+dx)\left(a+b\sinh^4(c+dx)\right)^3\,dx$$

Optimal antiderivative

$$\frac{(a+b)^3\cosh(dx+c)}{d}-\frac{2(a+b)^2(a+4b)\left(\cosh^3(dx+c)\right)}{3d}$$
$$+\frac{(a+b)\left(a^2+17ab+28b^2\right)\left(\cosh^5(dx+c)\right)}{5d}-\frac{4b\left(3a^2+15ab+14b^2\right)\left(\cosh^7(dx+c)\right)}{7d}$$
$$+\frac{b\left(3a^2+45ab+70b^2\right)\left(\cosh^9(dx+c)\right)}{9d}-\frac{2b^2(9a+28b)\left(\cosh^{11}(dx+c)\right)}{11d}$$
$$+\frac{b^2(3a+28b)\left(\cosh^{13}(dx+c)\right)}{13d}-\frac{8b^3\left(\cosh^{15}(dx+c)\right)}{15d}+\frac{b^3\left(\cosh^{17}(dx+c)\right)}{17d}$$

command

```
integrate(sinh(d*x+c)**5*(a+b*sinh(d*x+c)**4)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{a^3 \sinh^4(c+dx)\cosh(c+dx)}{d} - \frac{4a^3 \sinh^2(c+dx)\cosh^3(c+dx)}{3d} + \frac{8a^3\cosh^5(c+dx)}{15d} + \frac{3a^2b\sinh^8(c+dx)\cosh(c+dx)}{d} - \frac{8a^2b\sinh^6(c+dx)\cos}{d} \\ x\left(a+b\sinh^4(c)\right)^3\sinh^5(c) \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

80 Test file number 170

Test folder name:

`test_cases/6_Hyperbolic_functions/6.2_Hyperbolic_cosine/170_6.2.7_hyper^m-a+b_cosh^n-^p`

80.1 Problem number 26

$$\int \frac{\cosh(x)}{a+b\cosh^2(x)}\,dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{\sinh(x)\sqrt{b}}{\sqrt{a+b}}\right)}{\sqrt{b}\,\sqrt{a+b}}$$

command

`integrate(cosh(x)/(a+b*cosh(x)**2),x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

81 Test file number 172

Test folder name:

`test_cases/6_Hyperbolic_functions/6.3_Hyperbolic_tangent/172_6.3.2_Hyperbolic_tangent_functio`

81.1 Problem number 63

$$\int \frac{1}{(a+b\tanh(c+dx))^3}\,dx$$

Optimal antiderivative

$$\frac{a(a^2+3b^2)\,x}{(a^2-b^2)^3}-\frac{b(3a^2+b^2)\ln\left(a\cosh\left(dx+c\right)+b\sinh\left(dx+c\right)\right)}{(a^2-b^2)^3\,d}+\frac{b}{2\left(a^2-b^2\right)d\left(a+b\tanh\left(dx+c\right)\right)^2}+\frac{2ab}{(a^2-b^2)^2\,d\left(a+b\tanh\left(dx+c\right)\right)}$$

command

```
integrate(1/(a+b*tanh(d*x+c))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

82 Test file number 173

Test folder name:

```
test_cases/6_Hyperbolic_functions/6.3_Hyperbolic_tangent/173_6.3.7-d_hyper-^m-a+b-
c_tanh-^n-^p
```

82.1 Problem number 207

$$\int \frac{1}{\sqrt{-1+\tanh^2(x)}}\,dx$$

Optimal antiderivative

$$\frac{\tanh\left(x\right)}{\sqrt{-\operatorname{sech}\left(x\right)^2}}$$

command

```
integrate(1/(-1+tanh(x)**2)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\tanh(x)}{\sqrt{\tanh^2(x)-1}}$$

Sympy 1.8 under Python 3.8.8 output

$$\int \frac{1}{\sqrt{\tanh^2(x)-1}}\,dx$$

83 Test file number 175

Test folder name:

`test_cases/6_Hyperbolic_functions/6.4_Hyperbolic_cotangent/175_6.4.2_Hyperbolic_cotangent_fun`

83.1 Problem number 33

$$\int \left(b\coth^3(c+dx)\right)^{4/3}\,dx$$

Optimal antiderivative

$$-\frac{b\left(b\left(\coth^3(dx+c)\right)\right)^{\frac{1}{3}}}{d}-\frac{b\left(\coth^2(dx+c)\right)\left(b\left(\coth^3(dx+c)\right)\right)^{\frac{1}{3}}}{3d}+bx\left(b\left(\coth^3(dx+c)\right)\right)^{\frac{1}{3}}\tanh(dx+c)$$

command

```
integrate((b*coth(d*x+c)**3)**(4/3),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} x\left(b\coth^3(c)\right)^{\frac{4}{3}} & \text{for } d=0 \\ -\frac{\left(b\coth^3\left(dx+\log\left(-e^{-dx}\right)\right)\right)^{\frac{4}{3}}\log\left(-e^{-dx}\right)}{d} & \text{for } c=\log\left(-e^{-dx}\right) \\ -\frac{\left(b\coth^3\left(dx+\log\left(e^{-dx}\right)\right)\right)^{\frac{4}{3}}\log\left(e^{-dx}\right)}{d} & \text{for } c=\log\left(e^{-dx}\right) \\ x\left(\frac{b}{\tanh^3(c+dx)}\right)^{\frac{4}{3}}\tanh^4(c+dx)-\frac{\left(\frac{b}{\tanh^3(c+dx)}\right)^{\frac{4}{3}}\tanh^3(c+dx)}{d}-\frac{\left(\frac{b}{\tanh^3(c+dx)}\right)^{\frac{4}{3}}\tanh(c+dx)}{3d} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

84 Test file number 176

Test folder name:

test_cases/6_Hyperbolic_functions/6.4_Hyperbolic_cotangent/176_6.4.7-d_hyper-^m-a+b-c_coth-^n-^p

84.1 Problem number 1

$$\int \left(a + b\coth^2(c+dx)\right)^5 \, dx$$

Optimal antiderivative

$$(a+b)^5 x - \frac{b(5a^4 + 10a^3b + 10a^2b^2 + 5a\,b^3 + b^4)\coth(dx+c)}{d} - \frac{b^2(10a^3 + 10a^2b + 5a\,b^2 + b^3)\left(\coth^3(dx+c)\right)}{3d} - \frac{b^3(10a^2 + 5ab + b^2)\left(\coth^5(dx+c)\right)}{5d} - \frac{b^4(5a+b)\left(\coth^7(dx+c)\right)}{7d} - \frac{b^5\left(\coth^9(dx+c)\right)}{9d}$$

command

integrate((a+b*coth(d*x+c)2)**5,x)**

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a^5\log(-e^{-dx})}{d} - \frac{5a^4b\log(-e^{-dx})\coth^2(dx+\log(-e^{-dx}))}{d} - \frac{10a^3b^2\log(-e^{-dx})\coth^4(dx+\log(-e^{-dx}))}{d} - \frac{10a^2b^3\log(-e^{-dx})\coth^6}{d} \\ -\frac{a^5\log(e^{-dx})}{d} - \frac{5a^4b\log(e^{-dx})\coth^2(dx+\log(e^{-dx}))}{d} - \frac{10a^3b^2\log(e^{-dx})\coth^4(dx+\log(e^{-dx}))}{d} - \frac{10a^2b^3\log(e^{-dx})\coth^6(dx+\log(e}{d} \\ x\left(a+b\coth^2(c)\right)^5 \\ a^5x + 5a^4bx - \frac{5a^4b}{d\tanh(c+dx)} + 10a^3b^2x - \frac{10a^3b^2}{d\tanh(c+dx)} - \frac{10a^3b^2}{3d\tanh^3(c+dx)} + 10a^2b^3x - \frac{10a^2b^3}{d\tanh(c+dx)} - \frac{10a^2b^3}{3d\tanh^3(c+dx)} - \frac{}{d} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

85 Test file number 179

Test folder name:

test_cases/6_Hyperbolic_functions/6.5_Hyperbolic_secant/179_6.5.3_Hyperbolic_secant_functions

85.1 Problem number 31

$$\int \frac{1}{\operatorname{sech}^2(a+bx)^{7/2}}\,dx$$

Optimal antiderivative

$$\frac{\tanh(bx+a)}{7b\left(\operatorname{sech}(bx+a)^2\right)^{\frac{7}{2}}}+\frac{6\tanh(bx+a)}{35b\left(\operatorname{sech}(bx+a)^2\right)^{\frac{5}{2}}}+\frac{8\tanh(bx+a)}{35b\left(\operatorname{sech}(bx+a)^2\right)^{\frac{3}{2}}}+\frac{16\tanh(bx+a)}{35b\sqrt{\operatorname{sech}(bx+a)^2}}$$

command

```
integrate(1/(sech(b*x+a)**2)**(7/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{16\tanh^7(a+bx)}{35b(\operatorname{sech}^2(a+bx))^{\frac{7}{2}}}+\frac{8\tanh^5(a+bx)}{5b(\operatorname{sech}^2(a+bx))^{\frac{7}{2}}}-\frac{2\tanh^3(a+bx)}{b(\operatorname{sech}^2(a+bx))^{\frac{7}{2}}}+\frac{\tanh(a+bx)}{b(\operatorname{sech}^2(a+bx))^{\frac{7}{2}}} & \text{for } b\neq 0 \\ \frac{x}{(\operatorname{sech}^2(a))^{\frac{7}{2}}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

85.2 Problem number 157

$$\int \frac{e^{c(a+bx)}}{\operatorname{sech}^2(ac+bcx)^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{\operatorname{sech}(bcx+ac)\,e^{-4c(bx+a)}}{128bc\sqrt{\operatorname{sech}(bcx+ac)^2}}-\frac{5\operatorname{sech}(bcx+ac)\,e^{-2c(bx+a)}}{64bc\sqrt{\operatorname{sech}(bcx+ac)^2}}+\frac{5\,e^{2c(bx+a)}\operatorname{sech}(bcx+ac)}{32bc\sqrt{\operatorname{sech}(bcx+ac)^2}}$$
$$+\frac{5\,e^{4c(bx+a)}\operatorname{sech}(bcx+ac)}{128bc\sqrt{\operatorname{sech}(bcx+ac)^2}}+\frac{e^{6c(bx+a)}\operatorname{sech}(bcx+ac)}{192bc\sqrt{\operatorname{sech}(bcx+ac)^2}}+\frac{5x\operatorname{sech}(bcx+ac)}{16\sqrt{\operatorname{sech}(bcx+ac)^2}}$$

command

```
integrate(exp(c*(b*x+a))/(sech(b*c*x+a*c)**2)**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} x \\ \frac{xe^{ac}}{(\operatorname{sech}^2(ac))^{\frac{5}{2}}} \\ -\frac{5xe^{ac}e^{bcx}\tanh^5(ac+bcx)}{16(\operatorname{sech}^2(ac+bcx))^{\frac{5}{2}}} + \frac{5xe^{ac}e^{bcx}\tanh^4(ac+bcx)}{16(\operatorname{sech}^2(ac+bcx))^{\frac{5}{2}}} + \frac{5xe^{ac}e^{bcx}\tanh^3(ac+bcx)}{8(\operatorname{sech}^2(ac+bcx))^{\frac{5}{2}}} - \frac{5xe^{ac}e^{bcx}\tanh^2(ac+bcx)}{8(\operatorname{sech}^2(ac+bcx))^{\frac{5}{2}}} - \frac{5xe^{ac}e^{bcx}\tanh(ac+b}{16(\operatorname{sech}^2(ac+bcx))} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

86 Test file number 185

Test folder name:

test_cases/6_Hyperbolic_functions/6.7_Miscellaneous/185_6.7.1_Hyperbolic_functions

86.1 Problem number 172

$$\int \sinh^3(a+bx)\sinh^3(c+dx)\,dx$$

Optimal antiderivative

$$\frac{3\sinh(a-3c+(b-3d)x)}{32(b-3d)} - \frac{9\sinh(a-c+(b-d)x)}{32(b-d)} - \frac{\sinh(3a-3c+3(b-d)x)}{96(b-d)} + \frac{3\sinh(3a-c+(3b-d)x)}{32(3b-d)} + \frac{9\sinh(a+c+(b+d)x)}{32(b+d)} + \frac{\sinh(3a+3c+3(b+d)x)}{96b+96d} - \frac{3\sinh(3a+c+(3b+d)x)}{32(3b+d)} - \frac{3\sinh(a+3c+(b+3d)x)}{32(b+3d)}$$

command

```
integrate(sinh(b*x+a)**3*sinh(d*x+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

86.2 Problem number 178

$$\int \cosh^3(a+bx)\cosh^3(c+dx)\,dx$$

Optimal antiderivative

$$\frac{3\sinh(a-3c+(b-3d)x)}{32(b-3d)}+\frac{9\sinh(a-c+(b-d)x)}{32(b-d)}+\frac{\sinh(3a-3c+3(b-d)x)}{96b-96d}+\frac{3\sinh(3a-c+(3b-d)x)}{32(3b-d)}+\frac{9\sinh(a+c+(b+d)x)}{32(b+d)}+\frac{\sinh(3a+3c+3(b+d)x)}{96b+96d}+\frac{3\sinh(3a+c+(3b+d)x)}{32(3b+d)}+\frac{3\sinh(a+3c+(b+3d)x)}{32(b+3d)}$$

command

```
integrate(cosh(b*x+a)**3*cosh(d*x+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

86.3 Problem number 187

$$\int \cosh^3(c+dx)\sinh^3(a+bx)\,dx$$

Optimal antiderivative

$$-\frac{3\cosh(a-3c+(b-3d)x)}{32(b-3d)}-\frac{9\cosh(a-c+(b-d)x)}{32(b-d)}+\frac{\cosh(3a-3c+3(b-d)x)}{96b-96d}+\frac{3\cosh(3a-c+(3b-d)x)}{32(3b-d)}-\frac{9\cosh(a+c+(b+d)x)}{32(b+d)}+\frac{\cosh(3a+3c+3(b+d)x)}{96b+96d}+\frac{3\cosh(3a+c+(3b+d)x)}{32(3b+d)}-\frac{3\cosh(a+3c+(b+3d)x)}{32(b+3d)}$$

command

```
integrate(cosh(d*x+c)**3*sinh(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

86.4 Problem number 689

$$\int \frac{\sinh^2(x)}{a\cosh(x) + b\sinh(x)}\,dx$$

Optimal antiderivative

$$-\frac{a^2\arctan\left(\frac{b\cosh(x)+a\sinh(x)}{\sqrt{a^2-b^2}}\right)}{(a^2-b^2)^{\frac{3}{2}}} - \frac{b\cosh(x)}{a^2-b^2} + \frac{a\sinh(x)}{a^2-b^2}$$

command

```
integrate(sinh(x)**2/(a*cosh(x)+b*sinh(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\cosh(x) \\ \frac{\cosh(x)}{b} \\ -\frac{\sinh^2(x)}{-3b\sinh(x)+3b\cosh(x)} - \frac{2\sinh(x)\cosh(x)}{-3b\sinh(x)+3b\cosh(x)} + \frac{2\cosh^2(x)}{-3b\sinh(x)+3b\cosh(x)} \\ -\frac{\sinh^2(x)}{3b\sinh(x)+3b\cosh(x)} + \frac{2\sinh(x)\cosh(x)}{3b\sinh(x)+3b\cosh(x)} + \frac{2\cosh^2(x)}{3b\sinh(x)+3b\cosh(x)} \\ -\frac{a^2\log\left(\tanh\left(\frac{x}{2}\right)+\frac{b}{a}-\frac{\sqrt{-a^2+b^2}}{a}\right)\tanh^2\left(\frac{x}{2}\right)}{a^2\sqrt{-a^2+b^2}\tanh^2\left(\frac{x}{2}\right)-a^2\sqrt{-a^2+b^2}-b^2\sqrt{-a^2+b^2}\tanh^2\left(\frac{x}{2}\right)+b^2\sqrt{-a^2+b^2}} + \frac{a^2\log\left(\tanh\right.}{a^2\sqrt{-a^2+b^2}\tanh^2\left(\frac{x}{2}\right)-a^2\sqrt{-a^2}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

86.5 Problem number 692

$$\int \frac{\cosh^2(x)}{a\cosh(x) + b\sinh(x)}\,dx$$

Optimal antiderivative

$$-\frac{b^2\arctan\left(\frac{b\cosh(x)+a\sinh(x)}{\sqrt{a^2-b^2}}\right)}{(a^2-b^2)^{\frac{3}{2}}} - \frac{b\cosh(x)}{a^2-b^2} + \frac{a\sinh(x)}{a^2-b^2}$$

command

```
integrate(cosh(x)**2/(a*cosh(x)+b*sinh(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

86.6 Problem number 706

$$\int \frac{\cosh(x)\sinh(x)}{a\cosh(x)+b\sinh(x)}\,dx$$

Optimal antiderivative

$$\frac{ab\arctan\left(\frac{b\cosh(x)+a\sinh(x)}{\sqrt{a^2-b^2}}\right)}{(a^2-b^2)^{\frac{3}{2}}}+\frac{a\cosh(x)}{a^2-b^2}-\frac{b\sinh(x)}{a^2-b^2}$$

command

```
integrate(cosh(x)*sinh(x)/(a*cosh(x)+b*sinh(x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \tilde{\infty}\sinh(x) \\ \frac{\sinh(x)}{b} \\ -\frac{\sinh^2(x)}{-3b\sinh(x)+3b\cosh(x)}+\frac{\sinh(x)\cosh(x)}{-3b\sinh(x)+3b\cosh(x)}-\frac{\cosh^2(x)}{-3b\sinh(x)+3b\cosh(x)} \\ \frac{\sinh^2(x)}{3b\sinh(x)+3b\cosh(x)}+\frac{\sinh(x)\cosh(x)}{3b\sinh(x)+3b\cosh(x)}+\frac{\cosh^2(x)}{3b\sinh(x)+3b\cosh(x)} \\ \frac{ab\log\left(\tanh\left(\frac{x}{2}\right)+\frac{b}{a}-\frac{\sqrt{-a^2+b^2}}{a}\right)\tanh^2\left(\frac{x}{2}\right)}{a^2\sqrt{-a^2+b^2}\tanh^2\left(\frac{x}{2}\right)-a^2\sqrt{-a^2+b^2}-b^2\sqrt{-a^2+b^2}\tanh^2\left(\frac{x}{2}\right)+b^2\sqrt{-a^2+b^2}}-\frac{ab\log\left(\tanh\left(\frac{x}{2}\right.\right.}{a^2\sqrt{-a^2+b^2}\tanh^2\left(\frac{x}{2}\right)-a^2\sqrt{-a^2+} } \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

86.7 Problem number 810

$$\int \frac{1}{\left(\cosh^2(x)+\sinh^2(x)\right)^3}\,dx$$

Optimal antiderivative

$$\frac{\arctan(\tanh(x))}{2}+\frac{\operatorname{sech}(x)^2\tanh(x)}{2\left(1+\tanh^2(x)\right)^2}$$

command

```
integrate(1/(cosh(x)**2+sinh(x)**2)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

86.8 Problem number 913

$$\int e^{a+bx}\cosh^3(a+bx)\sinh^3(a+bx)\,dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^{-5bx-5a}}{320b}-\frac{3\,\mathrm{e}^{-bx-a}}{64b}-\frac{\mathrm{e}^{3bx+3a}}{64b}+\frac{\mathrm{e}^{7bx+7a}}{448b}$$

command

```
integrate(exp(b*x+a)*cosh(b*x+a)**3*sinh(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}-\frac{2e^ae^{bx}\sinh^6(a+bx)}{35b}+\frac{2e^ae^{bx}\sinh^5(a+bx)\cosh(a+bx)}{35b}+\frac{e^ae^{bx}\sinh^4(a+bx)\cosh^2(a+bx)}{7b}-\frac{e^ae^{bx}\sinh^3(a+bx)\cosh^3(a+bx)}{7b}+\frac{e^ae^{bx}\,\mathrm{s}}{} \\ xe^a\sinh^3(a)\cosh^3(a)\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

86.9 Problem number 931

$$\int e^{2(a+bx)}\cosh^3(a+bx)\sinh^3(a+bx)\,dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^{-4bx-4a}}{256b}-\frac{3\,\mathrm{e}^{4bx+4a}}{256b}+\frac{\mathrm{e}^{8bx+8a}}{512b}+\frac{3x}{64}$$

command

```
integrate(exp(2*b*x+2*a)*cosh(b*x+a)**3*sinh(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{3xe^{2a}e^{2bx}\sinh^6(a+bx)}{64}-\frac{3xe^{2a}e^{2bx}\sinh^5(a+bx)\cosh(a+bx)}{32}-\frac{3xe^{2a}e^{2bx}\sinh^4(a+bx)\cosh^2(a+bx)}{64}+\frac{3xe^{2a}e^{2bx}\sinh^3(a+bx)\cosh^3(a+b}{16} \\ xe^{2a}\sinh^3(a)\cosh^3(a)\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

86.10 Problem number 952

$$\int e^{c+dx} \cosh^2(a+bx) \sinh^3(a+bx) \, dx$$

Optimal antiderivative

$$-\frac{b\,\mathrm{e}^{dx+c}\cosh(bx+a)}{8(b^2-d^2)} - \frac{3b\,\mathrm{e}^{dx+c}\cosh(3bx+3a)}{16(9b^2-d^2)} + \frac{5b\,\mathrm{e}^{dx+c}\cosh(5bx+5a)}{16(25b^2-d^2)} + \frac{d\,\mathrm{e}^{dx+c}\sinh(bx+a)}{8b^2-8d^2} + \frac{d\,\mathrm{e}^{dx+c}\sinh(3bx+3a)}{144b^2-16d^2} - \frac{d\,\mathrm{e}^{dx+c}\sinh(5bx+5a)}{16(25b^2-d^2)}$$

command

```
integrate(exp(d*x+c)*cosh(b*x+a)**2*sinh(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

86.11 Problem number 959

$$\int e^{c+dx} \cosh^3(a+bx) \sinh^3(a+bx) \, dx$$

Optimal antiderivative

$$-\frac{3b\,\mathrm{e}^{dx+c}\cosh(2bx+2a)}{16(4b^2-d^2)} + \frac{3b\,\mathrm{e}^{dx+c}\cosh(6bx+6a)}{16(36b^2-d^2)} + \frac{3d\,\mathrm{e}^{dx+c}\sinh(2bx+2a)}{32(4b^2-d^2)} - \frac{d\,\mathrm{e}^{dx+c}\sinh(6bx+6a)}{32(36b^2-d^2)}$$

command

```
integrate(exp(d*x+c)*cosh(b*x+a)**3*sinh(b*x+a)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

86.12 Problem number 960

$$\int e^{c+dx}\cosh^3(a+bx)\sinh^2(a+bx)\,dx$$

Optimal antiderivative

$$\frac{d\,e^{dx+c}\cosh(bx+a)}{8b^2-8d^2}-\frac{d\,e^{dx+c}\cosh(3bx+3a)}{16(9b^2-d^2)}-\frac{d\,e^{dx+c}\cosh(5bx+5a)}{16(25b^2-d^2)}-\frac{b\,e^{dx+c}\sinh(bx+a)}{8(b^2-d^2)}+\frac{3b\,e^{dx+c}\sinh(3bx+3a)}{16(9b^2-d^2)}+\frac{5b\,e^{dx+c}\sinh(5bx+5a)}{16(25b^2-d^2)}$$

command

```
integrate(exp(d*x+c)*cosh(b*x+a)**3*sinh(b*x+a)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

87 Test file number 187

Test folder name:

```
test_cases/7_Inverse_hyperbolic_functions/7.1_Inverse_hyperbolic_sine/187_7.1.4-f_x-^m-d+e_x^2-^p-a+b_arcsinh-c_x-^n
```

87.1 Problem number 63

$$\int x^3\left(\pi+c^2\pi x^2\right)^{3/2}\left(a+b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$\frac{2b\,\pi^{\frac{3}{2}}x}{35c^3}-\frac{b\,\pi^{\frac{3}{2}}x^3}{105c}-\frac{8bc\,\pi^{\frac{3}{2}}x^5}{175}-\frac{b\,c^3\pi^{\frac{3}{2}}x^7}{49}-\frac{\left(c^2\pi\,x^2+\pi\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)}{5c^4\pi}+\frac{\left(c^2\pi\,x^2+\pi\right)^{\frac{7}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)}{7c^4\pi^2}$$

command

```
integrate(x**3*(pi*c**2*x**2+pi)**(3/2)*(a+b*asinh(c*x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\pi^{\frac{3}{2}}ac^2x^6\sqrt{c^2x^2+1}}{7} + \frac{8\pi^{\frac{3}{2}}ax^4\sqrt{c^2x^2+1}}{35} + \frac{\pi^{\frac{3}{2}}ax^2\sqrt{c^2x^2+1}}{35c^2} - \frac{2\pi^{\frac{3}{2}}a\sqrt{c^2x^2+1}}{35c^4} - \frac{\pi^{\frac{3}{2}}bc^3x^7}{49} + \frac{\pi^{\frac{3}{2}}bc^2x^6\sqrt{c^2x^2+1}\ \mathrm{as}}{7} \\ \frac{\pi^{\frac{3}{2}}ax^4}{4} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

87.2 Problem number 64

$$\int x^2\left(\pi+c^2\pi x^2\right)^{3/2}\left(a+b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$-\frac{b\,\pi^{\frac{3}{2}}x^2}{32c}-\frac{7bc\,\pi^{\frac{3}{2}}x^4}{96}-\frac{b\,c^3\pi^{\frac{3}{2}}x^6}{36}+\frac{x^3\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)}{6}$$
$$-\frac{\pi^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)^2}{32b\,c^3}+\frac{\pi^{\frac{3}{2}}x\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)\sqrt{c^2x^2+1}}{16c^2}$$
$$+\frac{\pi\,x^3\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)\sqrt{c^2\pi\,x^2+\pi}}{8}$$

command

```
integrate(x**2*(pi*c**2*x**2+pi)**(3/2)*(a+b*asinh(c*x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\pi^{\frac{3}{2}}ac^2x^5\sqrt{c^2x^2+1}}{6} + \frac{7\pi^{\frac{3}{2}}ax^3\sqrt{c^2x^2+1}}{24} + \frac{\pi^{\frac{3}{2}}ax\sqrt{c^2x^2+1}}{16c^2} - \frac{\pi^{\frac{3}{2}}a\,\mathrm{asinh}\,(cx)}{16c^3} - \frac{\pi^{\frac{3}{2}}bc^3x^6}{36} + \frac{\pi^{\frac{3}{2}}bc^2x^5\sqrt{c^2x^2+1}\ \mathrm{asinh}\,(ca}{6} \\ \frac{\pi^{\frac{3}{2}}ax^3}{3} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

87.3 Problem number 72

$$\int x^2\left(\pi+c^2\pi x^2\right)^{5/2}\left(a+b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$-\frac{5b\pi^{\frac{5}{2}}x^2}{256c}-\frac{59bc\pi^{\frac{5}{2}}x^4}{768}-\frac{17b\,c^3\pi^{\frac{5}{2}}x^6}{288}-\frac{b\,c^5\pi^{\frac{5}{2}}x^8}{64}+\frac{5\pi\,x^3(c^2\pi\,x^2+\pi)^{\frac{3}{2}}\,(a+b\,\mathrm{arcsinh}\,(cx))}{48}$$
$$+\frac{x^3(c^2\pi\,x^2+\pi)^{\frac{5}{2}}\,(a+b\,\mathrm{arcsinh}\,(cx))}{8}-\frac{5\pi^{\frac{5}{2}}(a+b\,\mathrm{arcsinh}\,(cx))^2}{256b\,c^3}$$
$$+\frac{5\pi^{\frac{5}{2}}x(a+b\,\mathrm{arcsinh}\,(cx))\,\sqrt{c^2x^2+1}}{128c^2}+\frac{5\pi^2x^3(a+b\,\mathrm{arcsinh}\,(cx))\,\sqrt{c^2\pi\,x^2+\pi}}{64}$$

command

```
integrate(x**2*(pi*c**2*x**2+pi)**(5/2)*(a+b*asinh(c*x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{\pi^{\frac{5}{2}}ac^4x^7\sqrt{c^2x^2+1}}{8}+\frac{17\pi^{\frac{5}{2}}ac^2x^5\sqrt{c^2x^2+1}}{48}+\frac{59\pi^{\frac{5}{2}}ax^3\sqrt{c^2x^2+1}}{192}+\frac{5\pi^{\frac{5}{2}}ax\sqrt{c^2x^2+1}}{128c^2}-\frac{5\pi^{\frac{5}{2}}a\,\mathrm{asinh}\,(cx)}{128c^3}-\frac{\pi^{\frac{5}{2}}bc^5x^8}{64}+\\ \frac{\pi^{\frac{5}{2}}ax^3}{3}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

87.4 Problem number 73

$$\int x\left(\pi+c^2\pi x^2\right)^{5/2}\left(a+b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$-\frac{b\,\pi^{\frac{5}{2}}x}{7c}-\frac{bc\,\pi^{\frac{5}{2}}x^3}{7}-\frac{3b\,c^3\pi^{\frac{5}{2}}x^5}{35}-\frac{b\,c^5\pi^{\frac{5}{2}}x^7}{49}+\frac{(c^2\pi\,x^2+\pi)^{\frac{7}{2}}\,(a+b\,\mathrm{arcsinh}\,(cx))}{7c^2\pi}$$

command

```
integrate(x*(pi*c**2*x**2+pi)**(5/2)*(a+b*asinh(c*x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{\pi^{\frac{5}{2}}ac^4x^6\sqrt{c^2x^2+1}}{7}+\frac{3\pi^{\frac{5}{2}}ac^2x^4\sqrt{c^2x^2+1}}{7}+\frac{3\pi^{\frac{5}{2}}ax^2\sqrt{c^2x^2+1}}{7}+\frac{\pi^{\frac{5}{2}}a\sqrt{c^2x^2+1}}{7c^2}-\frac{\pi^{\frac{5}{2}}bc^5x^7}{49}+\frac{\pi^{\frac{5}{2}}bc^4x^6\sqrt{c^2x^2+1}}{7}\\ \frac{\pi^{\frac{5}{2}}ax^2}{2}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

87.5 Problem number 74

$$\int \left(\pi + c^2\pi x^2\right)^{5/2} \left(a + b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$-\frac{25bc\,\pi^{\frac{5}{2}}x^2}{96} - \frac{5b\,c^3\pi^{\frac{5}{2}}x^4}{96} - \frac{b\,\pi^{\frac{5}{2}}\left(c^2x^2+1\right)^3}{36c} + \frac{5\pi x\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)}{24} + \frac{x\left(c^2\pi\,x^2+\pi\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)}{6} + \frac{5\pi^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)^2}{32bc} + \frac{5\pi^2x(a+b\,\mathrm{arcsinh}\,(cx))\sqrt{c^2\pi\,x^2+\pi}}{16}$$

command

```
integrate((pi*c**2*x**2+pi)**(5/2)*(a+b*asinh(c*x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\pi^{\frac{5}{2}}ac^4x^5\sqrt{c^2x^2+1}}{6} + \frac{13\pi^{\frac{5}{2}}ac^2x^3\sqrt{c^2x^2+1}}{24} + \frac{11\pi^{\frac{5}{2}}ax\sqrt{c^2x^2+1}}{16} + \frac{5\pi^{\frac{5}{2}}a\,\mathrm{asinh}\,(cx)}{16c} - \frac{\pi^{\frac{5}{2}}bc^5x^6}{36} + \frac{\pi^{\frac{5}{2}}bc^4x^5\sqrt{c^2x^2+1}\ \mathrm{as}}{6} \\ \pi^{\frac{5}{2}}ax \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

87.6 Problem number 252

$$\int \left(\pi + c^2\pi x^2\right)^{5/2} \left(a + b\sinh^{-1}(cx)\right)^2\,dx$$

Optimal antiderivative

$$\frac{65b^2\pi^{\frac{5}{2}}x\left(c^2x^2+1\right)^{\frac{3}{2}}}{1728} + \frac{b^2\pi^{\frac{5}{2}}x\left(c^2x^2+1\right)^{\frac{5}{2}}}{108} - \frac{115b^2\pi^{\frac{5}{2}}\,\mathrm{arcsinh}\,(cx)}{1152c} - \frac{5bc\,\pi^{\frac{5}{2}}x^2(a+b\,\mathrm{arcsinh}\,(cx))}{16} - \frac{5b\,\pi^{\frac{5}{2}}\left(c^2x^2+1\right)^2\left(a+b\,\mathrm{arcsinh}\,(cx)\right)}{48c} - \frac{b\,\pi^{\frac{5}{2}}\left(c^2x^2+1\right)^3\left(a+b\,\mathrm{arcsinh}\,(cx)\right)}{18c} + \frac{5\pi x\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)^2}{24} + \frac{x\left(c^2\pi\,x^2+\pi\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)^2}{6} + \frac{5\pi^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}\,(cx)\right)^3}{48bc} + \frac{245b^2\pi^{\frac{5}{2}}x\sqrt{c^2x^2+1}}{1152} + \frac{5\pi^2x(a+b\,\mathrm{arcsinh}\,(cx))^2\sqrt{c^2\pi\,x^2+\pi}}{16}$$

command

```
integrate((pi*c**2*x**2+pi)**(5/2)*(a+b*asinh(c*x))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\pi^{\frac{5}{2}}a^2c^4x^5\sqrt{c^2x^2+1}}{6} + \frac{13\pi^{\frac{5}{2}}a^2c^2x^3\sqrt{c^2x^2+1}}{24} + \frac{11\pi^{\frac{5}{2}}a^2x\sqrt{c^2x^2+1}}{16} + \frac{5\pi^{\frac{5}{2}}a^2\operatorname{asinh}(cx)}{16c} - \frac{\pi^{\frac{5}{2}}abc^5x^6}{18} + \frac{\pi^{\frac{5}{2}}abc^4x^5\sqrt{c^2x^2 -}}{3} \\ \pi^{\frac{5}{2}}a^2x \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

88 Test file number 192

Test folder name:

test_cases/7_Inverse_hyperbolic_functions/7.3_Inverse_hyperbolic_tangent/192_7.3.2-d_x-^m-a+b_arctanh-c_x^n-^p

88.1 Problem number 194

$$\int \frac{a+b\tanh^{-1}\left(c\sqrt{x}\right)}{x^4}\,dx$$

Optimal antiderivative

$$-\frac{bc}{15x^{\frac{5}{2}}} - \frac{b\,c^3}{9x^{\frac{3}{2}}} + \frac{b\,c^6\operatorname{arctanh}\left(c\sqrt{x}\right)}{3} + \frac{-a-b\operatorname{arctanh}\left(c\sqrt{x}\right)}{3x^3} - \frac{b\,c^5}{3\sqrt{x}}$$

command

```
integrate((a+b*atanh(c*x**(1/2)))/x**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{a}{3x^3} + \frac{b\operatorname{atanh}\left(\sqrt{x}\sqrt{\frac{1}{x}}\right)}{3x^3} \\ -\frac{a}{3x^3} - \frac{b\operatorname{atanh}\left(\sqrt{x}\sqrt{\frac{1}{x}}\right)}{3x^3} \\ -\frac{15ac^2x^{\frac{3}{2}}}{45c^2x^{\frac{9}{2}}-45x^{\frac{7}{2}}} + \frac{15a\sqrt{x}}{45c^2x^{\frac{9}{2}}-45x^{\frac{7}{2}}} + \frac{15bc^8x^{\frac{9}{2}}\operatorname{atanh}\left(c\sqrt{x}\right)}{45c^2x^{\frac{9}{2}}-45x^{\frac{7}{2}}} - \frac{15bc^7x^4}{45c^2x^{\frac{9}{2}}-45x^{\frac{7}{2}}} - \frac{15bc^6x^{\frac{7}{2}}\operatorname{atanh}\left(c\sqrt{x}\right)}{45c^2x^{\frac{9}{2}}-45x^{\frac{7}{2}}} + \frac{10bc^5x^3}{45c^2x^{\frac{9}{2}}-45x^{\frac{7}{2}}} + \frac{2bc}{45c^2x^{\frac{9}{2}}} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

89 Test file number 195

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.3_Inverse_hyperbolic_tangent/195_7.3.5_u-a+b_arctanh-c+d_x-^p`

89.1 Problem number 37

$$\int \frac{a+b\tanh^{-1}(c+dx)}{(e+fx)^3}\,dx$$

Optimal antiderivative

$$\frac{bd}{2(-cf+de-f)(-cf+de+f)(fx+e)}+\frac{-a-b\,\mathrm{arctanh}\,(dx+c)}{2f\,(fx+e)^2} \\ -\frac{b\,d^2\ln(-dx-c+1)}{4f\,(-cf+de+f)^2}+\frac{b\,d^2\ln(dx+c+1)}{4f\,(-cf+de-f)^2}-\frac{b\,d^2(-cf+de)\ln(fx+e)}{(-cf+de+f)^2\,(de-(1+c)\,f)^2}$$

command

```
integrate((a+b*atanh(d*x+c))/(f*x+e)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

90 Test file number 196

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.3_Inverse_hyperbolic_tangent/196_7.3.6_Exponentia`

90.1 Problem number 444

$$\int \frac{e^{n\tanh^{-1}(ax)}}{(c-acx)^2}\,dx$$

Optimal antiderivative

$$\frac{(-ax+1)^{-1-\frac{n}{2}}\,(ax+1)^{1+\frac{n}{2}}}{a\,c^2\,(2+n)}$$

command

```
integrate(exp(n*atanh(a*x))/(-a*c*x+c)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{x}{c^2} & \text{for } a = 0 \\ \tilde{\infty} x e^{\infty n} & \text{for } a = \frac{1}{x} \\ -\frac{ax \operatorname{atanh}(ax)}{a^2c^2xe^{2\operatorname{atanh}(ax)} - ac^2e^{2\operatorname{atanh}(ax)}} - \frac{\operatorname{atanh}(ax)}{a^2c^2xe^{2\operatorname{atanh}(ax)} - ac^2e^{2\operatorname{atanh}(ax)}} & \text{for } n = -2 \\ -\frac{axe^{n\operatorname{atanh}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} - \frac{e^{n\operatorname{atanh}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \text{NaN} & \text{for } a = \frac{1}{x} \wedge c = 0 \wedge n = -2 \\ \tilde{\infty} x e^{\infty n} & \text{for } a = \frac{1}{x} \\ \tilde{\infty} \int e^{n\operatorname{atanh}(ax)}\, dx & \text{for } c = 0 \\ -\frac{ax \operatorname{atanh}(ax)}{a^2c^2xe^{2\operatorname{atanh}(ax)} - ac^2e^{2\operatorname{atanh}(ax)}} - \frac{\operatorname{atanh}(ax)}{a^2c^2xe^{2\operatorname{atanh}(ax)} - ac^2e^{2\operatorname{atanh}(ax)}} & \text{for } n = -2 \\ -\frac{axe^{n\operatorname{atanh}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} - \frac{e^{n\operatorname{atanh}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} & \text{otherwise} \end{cases}$$

90.2 Problem number 445

$$\int \frac{e^{n\tanh^{-1}(ax)}}{(c - acx)^3}\, dx$$

Optimal antiderivative

$$\frac{(-ax+1)^{-1-\frac{n}{2}}\,(ax+1)^{1+\frac{n}{2}}}{a\,c^3\,(n^2+6n+8)} + \frac{(-ax+1)^{-2-\frac{n}{2}}\,(ax+1)^{1+\frac{n}{2}}}{a\,c^3\,(4+n)}$$

command

```
integrate(exp(n*atanh(a*x))/(-a*c*x+c)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

output too large to display

90.3 Problem number 446

$$\int \frac{e^{n \tanh^{-1}(ax)}}{(c-acx)^4}\,dx$$

Optimal antiderivative

$$\frac{2(-ax+1)^{-2-\frac{n}{2}}(ax+1)^{1+\frac{n}{2}}}{a\,c^4(n^2+10n+24)}+\frac{2(-ax+1)^{-1-\frac{n}{2}}(ax+1)^{1+\frac{n}{2}}}{a\,c^4(n^3+12n^2+44n+48)}+\frac{(-ax+1)^{-3-\frac{n}{2}}(ax+1)^{1+\frac{n}{2}}}{a\,c^4(6+n)}$$

command

```
integrate(exp(n*atanh(a*x))/(-a*c*x+c)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

90.4 Problem number 1315

$$\int \frac{e^{n \tanh^{-1}(ax)}}{c-a^2cx^2}\,dx$$

Optimal antiderivative

$$\frac{e^{n \operatorname{arctanh}(ax)}}{acn}$$

command

```
integrate(exp(n*atanh(a*x))/(-a**2*c*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{x}{c} & \text{for}\: a=0 \wedge n=0 \\ -\frac{\log\left(x-\frac{1}{a}\right)}{2ac}+\frac{\log\left(x+\frac{1}{a}\right)}{2ac} & \text{for}\: n=0 \\ \frac{x}{c} & \text{for}\: a=0 \\ \frac{e^{n \operatorname{atanh}(ax)}}{acn} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \tilde{\infty}x & \text{for}\: c=0 \wedge n=0 \\ \tilde{\infty}\int e^{n \operatorname{atanh}(ax)}\,dx & \text{for}\: c=0 \\ -\frac{\log\left(x-\frac{1}{a}\right)}{2ac}+\frac{\log\left(x+\frac{1}{a}\right)}{2ac} & \text{for}\: n=0 \\ \frac{e^{n \operatorname{atanh}(ax)}}{acn} & \text{otherwise} \end{cases}$$

91 Test file number 197

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.3_Inverse_hyperbolic_tangent/197_7.3.7_Inverse_hy`

91.1 Problem number 89

$$\int \frac{1}{\tanh^{-1}(\tanh(a+bx))}\,dx$$

Optimal antiderivative

$$\frac{\ln\left(\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)\right)}{b}$$

command

```
integrate(1/atanh(tanh(b*x+a)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{\log\left(\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)\right)}{b} & \text{for}\ b \neq 0 \\ \frac{x}{\operatorname{atanh}\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.2 Problem number 97

$$\int \frac{x}{\tanh^{-1}(\tanh(a+bx))^2}\,dx$$

Optimal antiderivative

$$-\frac{x}{b\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}+\frac{\ln\left(\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)\right)}{b^2}$$

command

```
integrate(x/atanh(tanh(b*x+a))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x}{b\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}+\frac{\log\left(\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)\right)}{b^2} & \text{for}\ b \neq 0 \\ \frac{x^2}{2\operatorname{atanh}^2\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.3 Problem number 98

$$\int \frac{1}{\tanh^{-1}(\tanh(a+bx))^2}\,dx$$

Optimal antiderivative

$$-\frac{1}{b\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}$$

command

`integrate(1/atanh(tanh(b*x+a))**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1}{b\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)} & \text{for } b \neq 0 \\ \frac{x}{\operatorname{atanh}^{2}\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.4 Problem number 105

$$\int \frac{x^2}{\tanh^{-1}(\tanh(a+bx))^3}\,dx$$

Optimal antiderivative

$$-\frac{x^{2}}{2b\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{2}}-\frac{x}{b^{2}\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}+\frac{\ln\left(\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)\right)}{b^{3}}$$

command

`integrate(x**2/atanh(tanh(b*x+a))**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x^{2}}{2b\operatorname{atanh}^{2}\left(\tanh\left(a+bx\right)\right)}-\frac{x}{b^{2}\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}+\frac{\log\left(\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)\right)}{b^{3}} & \text{for } b \neq 0 \\ \frac{x^{3}}{3\operatorname{atanh}^{3}\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.5 Problem number 106

$$\int \frac{x}{\tanh^{-1}(\tanh(a+bx))^3}\,dx$$

Optimal antiderivative

$$-\frac{x}{2b\,\text{arctanh}\left(\tanh\left(bx+a\right)\right)^2}-\frac{1}{2b^2\,\text{arctanh}\left(\tanh\left(bx+a\right)\right)}$$

command

```
integrate(x/atanh(tanh(b*x+a))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x}{2b\,\text{atanh}^2\left(\tanh\left(a+bx\right)\right)}-\frac{1}{2b^2\,\text{atanh}\left(\tanh\left(a+bx\right)\right)} & \text{for } b\neq 0 \\ \frac{x^2}{2\,\text{atanh}^3\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.6 Problem number 107

$$\int \frac{1}{\tanh^{-1}(\tanh(a+bx))^3}\,dx$$

Optimal antiderivative

$$-\frac{1}{2b\,\text{arctanh}\left(\tanh\left(bx+a\right)\right)^2}$$

command

```
integrate(1/atanh(tanh(b*x+a))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1}{2b\,\text{atanh}^2\left(\tanh\left(a+bx\right)\right)} & \text{for } b\neq 0 \\ \frac{x}{\text{atanh}^3\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.7 Problem number 130

$$\int x^3 \tanh^{-1}(\tanh(a+bx))^{5/2}\,dx$$

Optimal antiderivative

$$\frac{2x^3 \operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{7}{2}}}{7b}-\frac{4x^2 \operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{9}{2}}}{21b^2}+\frac{16x \operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{11}{2}}}{231b^3}-\frac{32 \operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{13}{2}}}{3003b^4}$$

command

```
integrate(x**3*atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2x^3 \operatorname{atanh}^{\frac{7}{2}}\left(\tanh\left(a+bx\right)\right)}{7b}-\frac{4x^2 \operatorname{atanh}^{\frac{9}{2}}\left(\tanh\left(a+bx\right)\right)}{21b^2}+\frac{16x \operatorname{atanh}^{\frac{11}{2}}\left(\tanh\left(a+bx\right)\right)}{231b^3}-\frac{32 \operatorname{atanh}^{\frac{13}{2}}\left(\tanh\left(a+bx\right)\right)}{3003b^4} & \text{for } b\neq 0 \\ \frac{x^4 \operatorname{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right)}{4} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

91.8 Problem number 131

$$\int x^2 \tanh^{-1}(\tanh(a+bx))^{5/2}\,dx$$

Optimal antiderivative

$$\frac{2x^2 \operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{7}{2}}}{7b}-\frac{8x \operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{9}{2}}}{63b^2}+\frac{16 \operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{11}{2}}}{693b^3}$$

command

```
integrate(x**2*atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2x^2 \operatorname{atanh}^{\frac{7}{2}}\left(\tanh\left(a+bx\right)\right)}{7b}-\frac{8x \operatorname{atanh}^{\frac{9}{2}}\left(\tanh\left(a+bx\right)\right)}{63b^2}+\frac{16 \operatorname{atanh}^{\frac{11}{2}}\left(\tanh\left(a+bx\right)\right)}{693b^3} & \text{for } b\neq 0 \\ \frac{x^3 \operatorname{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right)}{3} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

91.9 Problem number 132

$$\int x\tanh^{-1}(\tanh(a+bx))^{5/2}\,dx$$

Optimal antiderivative

$$\frac{2x\,\mathrm{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{7}{2}}}{7b}-\frac{4\,\mathrm{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{9}{2}}}{63b^{2}}$$

command

```
integrate(x*atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{2x\,\mathrm{atanh}^{\frac{7}{2}}\left(\tanh\left(a+bx\right)\right)}{7b}-\frac{4\,\mathrm{atanh}^{\frac{9}{2}}\left(\tanh\left(a+bx\right)\right)}{63b^{2}} & \text{for}\ b\neq 0\\ \frac{x^{2}\,\mathrm{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right)}{2} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

91.10 Problem number 133

$$\int \tanh^{-1}(\tanh(a+bx))^{5/2}\,dx$$

Optimal antiderivative

$$\frac{2\,\mathrm{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{7}{2}}}{7b}$$

command

```
integrate(atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{2\,\mathrm{atanh}^{\frac{7}{2}}\left(\tanh\left(a+bx\right)\right)}{7b} & \text{for}\ b\neq 0\\ x\,\mathrm{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right) & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

91.11 Problem number 144

$$\int \frac{1}{\sqrt{\tanh^{-1}(\tanh(a+bx))}}\,dx$$

Optimal antiderivative

$$\frac{2\sqrt{\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}}{b}$$

command

```
integrate(1/atanh(tanh(b*x+a))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{2\sqrt{\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}}{b} & \text{for}\ b\neq 0 \\ \frac{x}{\sqrt{\operatorname{atanh}\left(\tanh\left(a\right)\right)}} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.12 Problem number 152

$$\int \frac{x}{\tanh^{-1}(\tanh(a+bx))^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2x}{b\sqrt{\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}}+\frac{4\sqrt{\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}}{b^{2}}$$

command

```
integrate(x/atanh(tanh(b*x+a))**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2x}{b\sqrt{\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}}+\frac{4\sqrt{\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}}{b^{2}} & \text{for}\ b\neq 0 \\ \frac{x^{2}}{2\operatorname{atanh}^{\frac{3}{2}}\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.13 Problem number 153

$$\int \frac{1}{\tanh^{-1}(\tanh(a+bx))^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{2}{b\sqrt{\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}}$$

command

```
integrate(1/atanh(tanh(b*x+a))**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2}{b\sqrt{\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}} & \text{for}\ b\neq 0 \\ \frac{x}{\operatorname{atanh}^{\frac{3}{2}}\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.14 Problem number 159

$$\int \frac{x^3}{\tanh^{-1}(\tanh(a+bx))^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2x^3}{3b\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{3}{2}}}-\frac{32\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{3}{2}}}{3b^4}-\frac{4x^2}{b^2\sqrt{\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}}+\frac{16x\sqrt{\operatorname{arctanh}\left(\tanh\left(bx+a\right)\right)}}{b^3}$$

command

```
integrate(x**3/atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2x^3}{3b\operatorname{atanh}^{\frac{3}{2}}\left(\tanh\left(a+bx\right)\right)}-\frac{4x^2}{b^2\sqrt{\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}}+\frac{16x\sqrt{\operatorname{atanh}\left(\tanh\left(a+bx\right)\right)}}{b^3}-\frac{32\operatorname{atanh}^{\frac{3}{2}}\left(\tanh\left(a+bx\right)\right)}{3b^4} & \text{for}\ b \\ \frac{x^4}{4\operatorname{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right)} & \text{other} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.15 Problem number 160

$$\int \frac{x^2}{\tanh^{-1}(\tanh(a+bx))^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2x^2}{3b\,\text{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{3}{2}}}-\frac{8x}{3b^2\sqrt{\text{arctanh}\left(\tanh\left(bx+a\right)\right)}}+\frac{16\sqrt{\text{arctanh}\left(\tanh\left(bx+a\right)\right)}}{3b^3}$$

command

```
integrate(x**2/atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2x^2}{3b\,\text{atanh}^{\frac{3}{2}}\left(\tanh\left(a+bx\right)\right)}-\frac{8x}{3b^2\sqrt{\text{atanh}\left(\tanh\left(a+bx\right)\right)}}+\frac{16\sqrt{\text{atanh}\left(\tanh\left(a+bx\right)\right)}}{3b^3} & \text{for } b\neq 0\\ \frac{x^3}{3\,\text{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right)} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.16 Problem number 161

$$\int \frac{x}{\tanh^{-1}(\tanh(a+bx))^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2x}{3b\,\text{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{3}{2}}}-\frac{4}{3b^2\sqrt{\text{arctanh}\left(\tanh\left(bx+a\right)\right)}}$$

command

```
integrate(x/atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2x}{3b\,\text{atanh}^{\frac{3}{2}}\left(\tanh\left(a+bx\right)\right)}-\frac{4}{3b^2\sqrt{\text{atanh}\left(\tanh\left(a+bx\right)\right)}} & \text{for } b\neq 0\\ \frac{x^2}{2\,\text{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right)} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.17 Problem number 162

$$\int \frac{1}{\tanh^{-1}(\tanh(a+bx))^{5/2}}\,dx$$

Optimal antiderivative

$$-\frac{2}{3b\,\mathrm{arctanh}\left(\tanh\left(bx+a\right)\right)^{\frac{3}{2}}}$$

command

```
integrate(1/atanh(tanh(b*x+a))**(5/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{2}{3b\,\mathrm{atanh}^{\frac{3}{2}}\left(\tanh\left(a+bx\right)\right)} & \text{for } b \neq 0 \\ \frac{x}{\mathrm{atanh}^{\frac{5}{2}}\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

91.18 Problem number 168

$$\int x^{5/2}\tanh^{-1}(\tanh(a+bx))\,dx$$

Optimal antiderivative

$$-\frac{4b\,x^{\frac{9}{2}}}{63}+\frac{2x^{\frac{7}{2}}\,\mathrm{arctanh}\left(\tanh\left(bx+a\right)\right)}{7}$$

command

```
integrate(x**(5/2)*atanh(tanh(b*x+a)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{4bx^{\frac{9}{2}}}{63}+\frac{2x^{\frac{7}{2}}\,\mathrm{atanh}\left(\tanh\left(a+bx\right)\right)}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

91.19 Problem number 176

$$\int x^{5/2} \tanh^{-1}(\tanh(a+bx))^2 \, dx$$

Optimal antiderivative

$$\frac{16b^2x^{\frac{11}{2}}}{693} - \frac{8b\,x^{\frac{9}{2}} \operatorname{arctanh}(\tanh(bx+a))}{63} + \frac{2x^{\frac{7}{2}} \operatorname{arctanh}(\tanh(bx+a))^2}{7}$$

command

```
integrate(x**(5/2)*atanh(tanh(b*x+a))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{16b^2x^{\frac{11}{2}}}{693} - \frac{8bx^{\frac{9}{2}} \operatorname{atanh}(\tanh(a+bx))}{63} + \frac{2x^{\frac{7}{2}} \operatorname{atanh}^2(\tanh(a+bx))}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

91.20 Problem number 184

$$\int x^{5/2} \tanh^{-1}(\tanh(a+bx))^3 \, dx$$

Optimal antiderivative

$$-\frac{32b^3x^{\frac{13}{2}}}{3003} + \frac{16b^2x^{\frac{11}{2}} \operatorname{arctanh}(\tanh(bx+a))}{231} - \frac{4b\,x^{\frac{9}{2}} \operatorname{arctanh}(\tanh(bx+a))^2}{21} + \frac{2x^{\frac{7}{2}} \operatorname{arctanh}(\tanh(bx+a))^3}{7}$$

command

```
integrate(x**(5/2)*atanh(tanh(b*x+a))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{32b^3x^{\frac{13}{2}}}{3003} + \frac{16b^2x^{\frac{11}{2}} \operatorname{atanh}(\tanh(a+bx))}{231} - \frac{4bx^{\frac{9}{2}} \operatorname{atanh}^2(\tanh(a+bx))}{21} + \frac{2x^{\frac{7}{2}} \operatorname{atanh}^3(\tanh(a+bx))}{7}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

92 Test file number 198

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.4_Inverse_hyperbolic_cotangent/198_7.4.1_Inverse_`

92.1 Problem number 108

$$\int \frac{a+b\coth^{-1}(c+dx)}{(e+fx)^3}\,dx$$

Optimal antiderivative

$$\frac{bd}{2\left(-cf+de-f\right)\left(-cf+de+f\right)\left(fx+e\right)}+\frac{-a-b\,\mathrm{arccoth}(dx+c)}{2f\left(fx+e\right)^{2}} - \frac{b\,d^{2}\ln\left(-dx-c+1\right)}{4f\left(-cf+de+f\right)^{2}}+\frac{b\,d^{2}\ln\left(dx+c+1\right)}{4f\left(-cf+de-f\right)^{2}}-\frac{b\,d^{2}(-cf+de)\ln\left(fx+e\right)}{\left(-cf+de+f\right)^{2}\left(de-(1+c)\,f\right)^{2}}$$

command

```
integrate((a+b*acoth(d*x+c))/(f*x+e)**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

92.2 Problem number 162

$$\int \frac{1}{\coth^{-1}(\tanh(a+bx))}\,dx$$

Optimal antiderivative

$$\frac{\ln\left(\mathrm{arccoth}(\tanh\left(bx+a\right))\right)}{b}$$

command

```
integrate(1/acoth(tanh(b*x+a)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{\log\left(\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)\right)}{b} & \text{for}\ b\neq 0\\ \frac{x}{\operatorname{acoth}\left(\tanh\left(a\right)\right)} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

92.3 Problem number 170

$$\int \frac{x}{\coth^{-1}(\tanh(a+bx))^2}\,dx$$

Optimal antiderivative

$$-\frac{x}{b\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)}+\frac{\ln\left(\operatorname{arccoth}(\tanh\left(bx+a\right))\right)}{b^2}$$

command

```
integrate(x/acoth(tanh(b*x+a))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x}{b\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)}+\frac{\log\left(\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)\right)}{b^2} & \text{for } b\neq 0 \\ \frac{x^2}{2\operatorname{acoth}^2\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

92.4 Problem number 171

$$\int \frac{1}{\coth^{-1}(\tanh(a+bx))^2}\,dx$$

Optimal antiderivative

$$-\frac{1}{b\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)}$$

command

```
integrate(1/acoth(tanh(b*x+a))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1}{b\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)} & \text{for } b\neq 0 \\ \frac{x}{\operatorname{acoth}^2\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

92.5 Problem number 178

$$\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))^3}\,dx$$

Optimal antiderivative

$$-\frac{x^2}{2b\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^2}-\frac{x}{b^2\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)}+\frac{\ln\left(\operatorname{arccoth}(\tanh\left(bx+a\right))\right)}{b^3}$$

command

```
integrate(x**2/acoth(tanh(b*x+a))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x^2}{2b\operatorname{acoth}^2\left(\tanh\left(a+bx\right)\right)}-\frac{x}{b^2\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)}+\frac{\log\left(\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)\right)}{b^3} & \text{for } b\neq 0 \\ \frac{x^3}{3\operatorname{acoth}^3\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

92.6 Problem number 179

$$\int \frac{x}{\coth^{-1}(\tanh(a+bx))^3}\,dx$$

Optimal antiderivative

$$-\frac{x}{2b\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^2}-\frac{1}{2b^2\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)}$$

command

```
integrate(x/acoth(tanh(b*x+a))**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x}{2b\operatorname{acoth}^2\left(\tanh\left(a+bx\right)\right)}-\frac{1}{2b^2\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)} & \text{for } b\neq 0 \\ \frac{x^2}{2\operatorname{acoth}^3\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

92.7 Problem number 180

$$\int \frac{1}{\coth^{-1}(\tanh(a+bx))^3}\,dx$$

Optimal antiderivative

$$-\frac{1}{2b\mathrm{arccoth}\left(\tanh\left(bx+a\right)\right)^2}$$

command

`integrate(1/acoth(tanh(b*x+a))**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{1}{2b\operatorname{acoth}^2\left(\tanh\left(a+bx\right)\right)} & \text{for } b\neq 0 \\ \frac{x}{\operatorname{acoth}^3\left(\tanh\left(a\right)\right)} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: TypeError

93 Test file number 199

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.4_Inverse_hyperbolic_cotangent/199_7.4.2_Exponent`

93.1 Problem number 246

$$\int e^{3\coth^{-1}(ax)}(c-acx)^{3/2}\,dx$$

Optimal antiderivative

$$\frac{2(ax+1)\left(-acx+c\right)^{\frac{3}{2}}}{5\left(\frac{ax-1}{ax+1}\right)^{\frac{3}{2}}a}$$

command

`integrate(1/((a*x-1)/(a*x+1))**(3/2)*(-a*c*x+c)**(3/2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{8c\sqrt{-acx+c}}{5a\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}+\frac{8(-acx+c)^{\frac{3}{2}}}{5a\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}-\frac{2(-acx+c)^{\frac{5}{2}}}{5ac\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

93.2 Problem number 321

$$\int e^{\coth^{-1}(x)}(1-x)^{3/2}x\,dx$$

Optimal antiderivative

$$\frac{44\left(1+\frac{1}{x}\right)^{\frac{3}{2}}(1-x)^{\frac{3}{2}}}{105\left(1-\frac{1}{x}\right)^{\frac{3}{2}}}-\frac{22\left(1+\frac{1}{x}\right)^{\frac{3}{2}}(1-x)^{\frac{3}{2}}x}{35\left(1-\frac{1}{x}\right)^{\frac{3}{2}}}+\frac{2\left(1+\frac{1}{x}\right)^{\frac{3}{2}}(1-x)^{\frac{3}{2}}x^2}{7\left(1-\frac{1}{x}\right)^{\frac{3}{2}}}$$

command

```
integrate(1/((-1+x)/(1+x))**(1/2)*(1-x)**(3/2)*x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2(1-x)^{\frac{7}{2}}}{7\sqrt{-\frac{x}{-x-1}+\frac{1}{-x-1}}}-\frac{18(1-x)^{\frac{5}{2}}}{35\sqrt{-\frac{x}{-x-1}+\frac{1}{-x-1}}}-\frac{4(1-x)^{\frac{3}{2}}}{105\sqrt{-\frac{x}{-x-1}+\frac{1}{-x-1}}}-\frac{16\sqrt{1-x}}{105\sqrt{-\frac{x}{-x-1}+\frac{1}{-x-1}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

93.3 Problem number 333

$$\int \frac{e^{\coth^{-1}(x)}x}{(1-x)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{5\left(1-\frac{1}{x}\right)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{2}\,\sqrt{\frac{1}{x}}}{\sqrt{1+\frac{1}{x}}}\right)\sqrt{2}}{2\,(1-x)^{\frac{3}{2}}\left(\frac{1}{x}\right)^{\frac{3}{2}}}-\frac{\left(1+\frac{1}{x}\right)^{\frac{3}{2}}x^2\sqrt{1-\frac{1}{x}}}{2\,(1-x)^{\frac{3}{2}}}+\frac{5\left(1-\frac{1}{x}\right)^{\frac{3}{2}}x^2\sqrt{1+\frac{1}{x}}}{2\,(1-x)^{\frac{3}{2}}}$$

command

```
integrate(1/((-1+x)/(1+x))**(1/2)*x/(1-x)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$2\left(\begin{cases}\sqrt{2}\left(\frac{\sqrt{2}\sqrt{-x-1}}{2}-\operatorname{acos}\left(\frac{\sqrt{2}}{\sqrt{1-x}}\right)\right) & \text{for } \sqrt{1-x}>-\sqrt{2}\wedge\sqrt{1-x}<\sqrt{2}\end{cases}\right)$$

$$-2\left(\begin{cases}\frac{\sqrt{2}\left(\frac{\operatorname{acos}\left(\frac{\sqrt{2}}{\sqrt{1-x}}\right)}{2}-\frac{\sqrt{2}\sqrt{1-\frac{2}{1-x}}}{2\sqrt{1-x}}\right)}{2} & \text{for } \sqrt{1-x}>-\sqrt{2}\wedge\sqrt{1-x}<\sqrt{2}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

$$\int\frac{x}{\sqrt{\frac{x-1}{x+1}}\,(1-x)^{\frac{3}{2}}}\,dx$$

93.4 Problem number 334

$$\int\frac{e^{\coth^{-1}(x)}}{(1-x)^{3/2}}\,dx$$

Optimal antiderivative

$$-\frac{\left(1-\frac{1}{x}\right)^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{2}\sqrt{\frac{1}{x}}}{\sqrt{1+\frac{1}{x}}}\right)\sqrt{2}}{2\,(1-x)^{\frac{3}{2}}\left(\frac{1}{x}\right)^{\frac{3}{2}}}-\frac{x\sqrt{1-\frac{1}{x}}\,\sqrt{1+\frac{1}{x}}}{(1-x)^{\frac{3}{2}}}$$

command

```
integrate(1/((-1+x)/(1+x))**(1/2)/(1-x)**(3/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-2\left(\begin{cases}\frac{\sqrt{2}\left(\frac{\operatorname{acos}\left(\frac{\sqrt{2}}{\sqrt{1-x}}\right)}{2}-\frac{\sqrt{2}\sqrt{1-\frac{2}{1-x}}}{2\sqrt{1-x}}\right)}{2} & \text{for } \sqrt{1-x}>-\sqrt{2}\wedge\sqrt{1-x}<\sqrt{2}\end{cases}\right)$$

Sympy 1.8 under Python 3.8.8 output

$$\int\frac{1}{\sqrt{\frac{x-1}{x+1}}\,(1-x)^{\frac{3}{2}}}\,dx$$

93.5 Problem number 336

$$\int e^{-\coth^{-1}(ax)}x^2\sqrt{c-acx}\,dx$$

Optimal antiderivative

$$\frac{6x(-acx+c)^{\frac{3}{2}}\sqrt{1-\frac{1}{a^2x^2}}}{35a^2c}-\frac{2x^2(-acx+c)^{\frac{3}{2}}\sqrt{1-\frac{1}{a^2x^2}}}{7ac}+\frac{152cx\sqrt{1-\frac{1}{a^2x^2}}}{105a^2\sqrt{-acx+c}}+\frac{38x\sqrt{1-\frac{1}{a^2x^2}}\sqrt{-acx+c}}{105a^2}$$

command

```
integrate(x**2*(-a*c*x+c)**(1/2)*((a*x-1)/(a*x+1))**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{304c\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}{105a^3\sqrt{-acx+c}}-\frac{76\sqrt{-acx+c}\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}{105a^3}-\frac{62(-acx+c)^{\frac{3}{2}}\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}{105a^3c}+\frac{24(-acx+c)^{\frac{5}{2}}\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}{35a^3c^2}-\frac{2(-acx+c)^{\frac{7}{2}}\sqrt{-\frac{acx}{-acx-c}+\frac{c}{-acx-c}}}{7a^3c^3}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

93.6 Problem number 369

$$\int \frac{e^{n\coth^{-1}(ax)}}{(c-acx)^2}\,dx$$

Optimal antiderivative

$$-\frac{\left(1-\frac{1}{ax}\right)^{-1-\frac{n}{2}}\left(1+\frac{1}{ax}\right)^{1+\frac{n}{2}}}{a\,c^2\,(2+n)}$$

command

`integrate(exp(n*acoth(a*x))/(-a*c*x+c)**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{xe^{\frac{i\pi n}{2}}}{c^2} & \text{for } a = 0 \\ \tilde{\infty} xe^{\infty n} & \text{for } a = \frac{1}{x} \\ -\frac{ax \operatorname{acoth}(ax)}{a^2c^2xe^{2 \operatorname{acoth}(ax)} - ac^2e^{2 \operatorname{acoth}(ax)}} - \frac{\operatorname{acoth}(ax)}{a^2c^2xe^{2 \operatorname{acoth}(ax)} - ac^2e^{2 \operatorname{acoth}(ax)}} & \text{for } n = -2 \\ -\frac{axe^{n \operatorname{acoth}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} - \frac{e^{n \operatorname{acoth}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \text{NaN} & \text{for } a = \frac{1}{x} \wedge c = 0 \wedge n = -2 \\ \tilde{\infty} xe^{\infty n} & \text{for } a = \frac{1}{x} \\ \tilde{\infty} \int e^{n \operatorname{acoth}(ax)}\, dx & \text{for } c = 0 \\ -\frac{ax \operatorname{acoth}(ax)}{a^2c^2xe^{2 \operatorname{acoth}(ax)} - ac^2e^{2 \operatorname{acoth}(ax)}} - \frac{\operatorname{acoth}(ax)}{a^2c^2xe^{2 \operatorname{acoth}(ax)} - ac^2e^{2 \operatorname{acoth}(ax)}} & \text{for } n = -2 \\ -\frac{axe^{n \operatorname{acoth}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} - \frac{e^{n \operatorname{acoth}(ax)}}{a^2c^2nx + 2a^2c^2x - ac^2n - 2ac^2} & \text{otherwise} \end{cases}$$

93.7 Problem number 370

$$\int \frac{e^{n \coth^{-1}(ax)}}{(c - acx)^3}\, dx$$

Optimal antiderivative

$$-\frac{(3+n)\left(1-\frac{1}{ax}\right)^{-1-\frac{n}{2}}\left(1+\frac{1}{ax}\right)^{1+\frac{n}{2}}}{a\,c^3\,(n^2+6n+8)} + \frac{\left(1-\frac{1}{ax}\right)^{-2-\frac{n}{2}}\left(1+\frac{1}{ax}\right)^{1+\frac{n}{2}}}{a\,c^3\,(4+n)}$$

command

`integrate(exp(n*acoth(a*x))/(-a*c*x+c)**3,x)`

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

output too large to display

93.8 Problem number 371

$$\int \frac{e^{n\coth^{-1}(ax)}}{(c-acx)^4}\,dx$$

Optimal antiderivative

$$-\frac{(n^2+8n+14)\left(1-\frac{1}{ax}\right)^{-2-\frac{n}{2}}\left(1+\frac{1}{ax}\right)^{1+\frac{n}{2}}}{a\,c^4\,(n^2+10n+24)}-\frac{(n^2+8n+14)\left(1-\frac{1}{ax}\right)^{-1-\frac{n}{2}}\left(1+\frac{1}{ax}\right)^{1+\frac{n}{2}}}{a\,c^4\,(n^3+12n^2+44n+48)}+\frac{(5+n)\left(1-\frac{1}{ax}\right)^{-3-\frac{n}{2}}\left(1+\frac{1}{ax}\right)^{1+\frac{n}{2}}}{a\,c^4\,(6+n)}-\frac{\left(1-\frac{1}{ax}\right)^{-3-\frac{n}{2}}\left(1+\frac{1}{ax}\right)^{1+\frac{n}{2}}}{a^2c^4x}$$

command

```
integrate(exp(n*acoth(a*x))/(-a*c*x+c)**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

93.9 Problem number 740

$$\int \frac{e^{n\coth^{-1}(ax)}}{c-a^2cx^2}\,dx$$

Optimal antiderivative

$$\frac{e^{n\,\mathrm{arccoth}(ax)}}{acn}$$

command

```
integrate(exp(n*acoth(a*x))/(-a**2*c*x**2+c),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{x}{c} & \text{for}\: a = 0 \wedge n = 0 \\ - \frac{\log{\left(x - \frac{1}{a} \right)}}{2ac} + \frac{\log{\left(x + \frac{1}{a} \right)}}{2ac} & \text{for}\: n = 0 \\ \frac{x e^{\frac{i\pi n}{2}}}{c} & \text{for}\: a = 0 \\ \frac{e^{n\,\operatorname{acoth}{\left(ax \right)}}}{acn} & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

$$\begin{cases} \tilde{\infty}x & \text{for } c = 0 \wedge n = 0 \\ \tilde{\infty} \int e^{n \operatorname{acoth}(ax)}\, dx & \text{for } c = 0 \\ -\frac{\log\left(x - \frac{1}{a}\right)}{2ac} + \frac{\log\left(x + \frac{1}{a}\right)}{2ac} & \text{for } n = 0 \\ \frac{e^{n \operatorname{acoth}(ax)}}{acn} & \text{otherwise} \end{cases}$$

94 Test file number 201

Test folder name:

test_cases/7_Inverse_hyperbolic_functions/7.5_Inverse_hyperbolic_secant/201_7.5.2_Inverse_hyp

94.1 Problem number 80

$$\int e^{-\operatorname{sech}^{-1}(ax)}\, dx$$

Optimal antiderivative

$$\frac{\ln(ax+1)}{a} + \frac{2\ln\left(1 + \sqrt{\frac{-ax+1}{ax+1}}\right)}{a} - \frac{(ax+1)\sqrt{\frac{-ax+1}{ax+1}}}{a}$$

command

integrate(1/(1/a/x+(1/a/x-1)(1/2)*(1+1/a/x)**(1/2)),x)**

Sympy 1.10.1 under Python 3.10.4 output

$$-2a^2\left(\left\{\frac{2\left(\frac{\sqrt{-1+\frac{1}{ax}}}{2\sqrt{1+\frac{1}{ax}}\left(\frac{-1+\frac{1}{ax}}{1+\frac{1}{ax}}+1\right)} - \frac{\log\left(\frac{\sqrt{-1+\frac{1}{ax}}}{\sqrt{1+\frac{1}{ax}}}+1\right)}{2} + \frac{\log\left(\frac{-1+\frac{1}{ax}}{1+\frac{1}{ax}}+1\right)}{4}\right)}{a^3} \quad \text{for } \sqrt{1+\frac{1}{ax}} > -\sqrt{2} \wedge \sqrt{1+\frac{1}{ax}} < \sqrt{2}\right.\right.$$

Sympy 1.8 under Python 3.8.8 output

$$a\int \frac{x}{ax\sqrt{-1+\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}+1}\, dx$$

95 Test file number 204

Test folder name:

`test_cases/8_Special_functions/204_8.1_Error_functions`

95.1 Problem number 4

$$\int \frac{\text{Erf}(bx)}{x}\, dx$$

Optimal antiderivative

$$\frac{2bx \,\text{hypergeom}\left(\left[\frac{1}{2}, \frac{1}{2}\right], \left[\frac{3}{2}, \frac{3}{2}\right], -b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(erf(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2bx\,{}_2F_2\left(\left.\begin{matrix}\frac{1}{2}, \frac{1}{2}\\ \frac{3}{2}, \frac{3}{2}\end{matrix}\right| -b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.2 Problem number 64

$$\int e^{c+b^2x^2}x^5\text{Erf}(bx)\, dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^{b^2x^2+c}\,\mathrm{erf}\,(bx)}{b^6} - \frac{\mathrm{e}^{b^2x^2+c}x^2\,\mathrm{erf}\,(bx)}{b^4} + \frac{\mathrm{e}^{b^2x^2+c}x^4\,\mathrm{erf}\,(bx)}{2b^2} - \frac{2\,\mathrm{e}^c x}{b^5\sqrt{\pi}} + \frac{2\,\mathrm{e}^c x^3}{3b^3\sqrt{\pi}} - \frac{\mathrm{e}^c x^5}{5b\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*x**5*erf(b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x^5e^c}{5\sqrt{\pi}\,b} + \frac{x^4e^ce^{b^2x^2}\,\mathrm{erf}\,(bx)}{2b^2} + \frac{2x^3e^c}{3\sqrt{\pi}\,b^3} - \frac{x^2e^ce^{b^2x^2}\,\mathrm{erf}\,(bx)}{b^4} - \frac{2xe^c}{\sqrt{\pi}\,b^5} + \frac{e^ce^{b^2x^2}\,\mathrm{erf}\,(bx)}{b^6} & \text{for } b \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

95.3 Problem number 67

$$\int \frac{e^{c+b^2x^2}\operatorname{Erf}(bx)}{x}\,dx$$

Optimal antiderivative

$$\frac{2b\,\mathrm{e}^{c}x\,\text{hypergeom}\left(\left[\frac{1}{2},1\right],\left[\frac{3}{2},\frac{3}{2}\right],b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*erf(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2bxe^{c}{}_{2}F_{2}\left(\begin{matrix}\frac{1}{2},1\\ \frac{3}{2},\frac{3}{2}\end{matrix}\middle|b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.4 Problem number 68

$$\int \frac{e^{c+b^2x^2}\operatorname{Erf}(bx)}{x^3}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{b^2x^2+c}\operatorname{erf}(bx)}{2x^2}-\frac{b\,\mathrm{e}^{c}}{x\sqrt{\pi}}+\frac{2b^3\mathrm{e}^{c}x\,\text{hypergeom}\left(\left[\frac{1}{2},1\right],\left[\frac{3}{2},\frac{3}{2}\right],b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*erf(b*x)/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2be^{c}{}_{2}F_{2}\left(\begin{matrix}-\frac{1}{2},1\\ \frac{1}{2},\frac{3}{2}\end{matrix}\middle|b^2x^2\right)}{\sqrt{\pi}\,x}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.5 Problem number 71

$$\int e^{c+b^2x^2}x^2\mathrm{Erf}(bx)\,dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^{b^2x^2+c}x\,\mathrm{erf}\,(bx)}{2b^2}-\frac{\mathrm{e}^c x^2}{2b\sqrt{\pi}}-\frac{\mathrm{e}^c x^2\,\mathrm{hypergeom}\left([1,1]\,,\left[\frac{3}{2},2\right],b^2x^2\right)}{2b\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*x**2*erf(b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{bx^4e^c{}_2F_2\left(\begin{matrix}1,2\\ \frac{3}{2},3\end{matrix}\middle|b^2x^2\right)}{2\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.6 Problem number 72

$$\int e^{c+b^2x^2}\mathrm{Erf}(bx)\,dx$$

Optimal antiderivative

$$\frac{b\,\mathrm{e}^c x^2\,\mathrm{hypergeom}\left([1,1]\,,\left[\frac{3}{2},2\right],b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*erf(b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{bx^2e^c{}_2F_2\left(\begin{matrix}1,1\\ \frac{3}{2},2\end{matrix}\middle|b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.7 Problem number 73

$$\int \frac{e^{c+b^2x^2}\mathrm{Erf}(bx)}{x^2}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{b^2x^2+c}\,\mathrm{erf}\,(bx)}{x}+\frac{2b^3\mathrm{e}^c x^2\,\mathrm{hypergeom}\left([1,1]\,,\left[\frac{3}{2},2\right],b^2x^2\right)}{\sqrt{\pi}}+\frac{2b\,\mathrm{e}^c\ln(x)}{\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*erf(b*x)/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2b^3x^2e^c{}_2F_2\left(\begin{matrix}1,1\\2,\frac{5}{2}\end{matrix}\middle|b^2x^2\right)}{3\sqrt{\pi}}+\frac{be^c\log\left(b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.8 Problem number 74

$$\int \frac{e^{c+b^2x^2}\mathrm{Erf}(bx)}{x^4}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{b^2x^2+c}\,\mathrm{erf}\,(bx)}{3x^3}-\frac{2b^2\mathrm{e}^{b^2x^2+c}\,\mathrm{erf}\,(bx)}{3x}-\frac{b\,\mathrm{e}^c}{3x^2\sqrt{\pi}}+\frac{4b^5\mathrm{e}^c x^2\,\mathrm{hypergeom}\left([1,1]\,,\left[\frac{3}{2},2\right],b^2x^2\right)}{3\sqrt{\pi}}+\frac{4b^3\mathrm{e}^c\ln(x)}{3\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*erf(b*x)/x**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{b^3G_{3,2}^{1,2}\left(\begin{matrix}2,1 & \frac{5}{2}\\2 & 0\end{matrix}\middle|\frac{e^{-i\pi}}{b^2x^2}\right)e^c}{2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

95.9 Problem number 107

$$\int \frac{\operatorname{Erfc}(bx)}{x}\,dx$$

Optimal antiderivative

$$\ln(x) - \frac{2bx\,\mathrm{hypergeom}\left(\left[\frac{1}{2},\frac{1}{2}\right],\left[\frac{3}{2},\frac{3}{2}\right],-b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(erfc(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2bx\,{}_2F_2\left(\begin{matrix}\frac{1}{2},\frac{1}{2}\\ \frac{3}{2},\frac{3}{2}\end{matrix}\middle|-b^2x^2\right)}{\sqrt{\pi}}+\frac{\log\left(b^2x^2\right)}{2}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.10 Problem number 167

$$\int e^{c+b^2x^2}x^5\operatorname{Erfc}(bx)\,dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^{b^2x^2+c}\operatorname{erfc}(bx)}{b^6}-\frac{\mathrm{e}^{b^2x^2+c}x^2\operatorname{erfc}(bx)}{b^4}+\frac{\mathrm{e}^{b^2x^2+c}x^4\operatorname{erfc}(bx)}{2b^2}+\frac{2\,\mathrm{e}^cx}{b^5\sqrt{\pi}}-\frac{2\,\mathrm{e}^cx^3}{3b^3\sqrt{\pi}}+\frac{\mathrm{e}^cx^5}{5b\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*x**5*erfc(b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{x^5e^c}{5\sqrt{\pi}\,b}+\frac{x^4e^ce^{b^2x^2}\operatorname{erfc}(bx)}{2b^2}-\frac{2x^3e^c}{3\sqrt{\pi}\,b^3}-\frac{x^2e^ce^{b^2x^2}\operatorname{erfc}(bx)}{b^4}+\frac{2xe^c}{\sqrt{\pi}\,b^5}+\frac{e^ce^{b^2x^2}\operatorname{erfc}(bx)}{b^6} & \text{for } b\neq 0\\ \frac{x^6e^c}{6} & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

95.11 Problem number 170

$$\int \frac{e^{c+b^2x^2}\mathrm{Erfc}(bx)}{x}\,dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^c \,\mathrm{expIntegral}\left(b^2x^2\right)}{2}-\frac{2b\,\mathrm{e}^c x\,\mathrm{hypergeom}\left(\left[\frac{1}{2},1\right],\left[\frac{3}{2},\frac{3}{2}\right],b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*erfc(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2bxe^c{}_2F_2\left(\begin{matrix}\frac{1}{2},1\\ \frac{3}{2},\frac{3}{2}\end{matrix}\middle|b^2x^2\right)}{\sqrt{\pi}}+\frac{e^c\,\mathrm{Ei}\left(b^2x^2\right)}{2}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.12 Problem number 171

$$\int \frac{e^{c+b^2x^2}\mathrm{Erfc}(bx)}{x^3}\,dx$$

Optimal antiderivative

$$\frac{b^2\mathrm{e}^c \,\mathrm{expIntegral}\left(b^2x^2\right)}{2}-\frac{\mathrm{e}^{b^2x^2+c}\mathrm{erfc}(bx)}{2x^2}+\frac{b\,\mathrm{e}^c}{x\sqrt{\pi}}-\frac{2b^3\mathrm{e}^c x\,\mathrm{hypergeom}\left(\left[\frac{1}{2},1\right],\left[\frac{3}{2},\frac{3}{2}\right],b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(exp(b**2*x**2+c)*erfc(b*x)/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{b^2e^c\,\mathrm{Ei}\left(b^2x^2\right)}{2}+\frac{2be^c{}_2F_2\left(\begin{matrix}-\frac{1}{2},1\\ \frac{1}{2},\frac{3}{2}\end{matrix}\middle|b^2x^2\right)}{\sqrt{\pi}\,x}-\frac{e^ce^{b^2x^2}}{2x^2}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.13 Problem number 174

$$\int e^{c+b^2x^2}x^2\text{Erfc}(bx)\,dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^{b^2x^2+c}x\,\text{erfc}(bx)}{2b^2}+\frac{\mathrm{e}^c x^2}{2b\sqrt{\pi}}+\frac{\mathrm{e}^c x^2\,\text{hypergeom}\left([1,1],\left[\frac{3}{2},2\right],b^2x^2\right)}{2b\sqrt{\pi}}-\frac{\mathrm{e}^c\,\text{erfi}\,(bx)\sqrt{\pi}}{4b^3}$$

command

```
integrate(exp(b**2*x**2+c)*x**2*erfc(b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{bx^4e^c{}_2F_2\left(\begin{matrix}1,2\\ \frac{3}{2},3\end{matrix}\middle|b^2x^2\right)}{2\sqrt{\pi}}+\frac{xe^ce^{b^2x^2}}{2b^2}+\frac{i\sqrt{\pi}\,e^c\,\text{erf}\,(ibx)}{4b^3}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.14 Problem number 175

$$\int e^{c+b^2x^2}\text{Erfc}(bx)\,dx$$

Optimal antiderivative

$$-\frac{b\,\mathrm{e}^c x^2\,\text{hypergeom}\left([1,1],\left[\frac{3}{2},2\right],b^2x^2\right)}{\sqrt{\pi}}+\frac{\mathrm{e}^c\,\text{erfi}\,(bx)\sqrt{\pi}}{2b}$$

command

```
integrate(exp(b**2*x**2+c)*erfc(b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{bx^2e^c{}_2F_2\left(\begin{matrix}1,1\\ \frac{3}{2},2\end{matrix}\middle|b^2x^2\right)}{\sqrt{\pi}}-\frac{i\sqrt{\pi}\,e^c\,\text{erf}\,(ibx)}{2b}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.15 Problem number 176

$$\int \frac{e^{c+b^2x^2}\text{Erfc}(bx)}{x^2}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{b^2x^2+c}\mathrm{erfc}(bx)}{x}-\frac{2b^3\mathrm{e}^c x^2\,\mathrm{hypergeom}\left([1,1],\left[\frac{3}{2},2\right],b^2x^2\right)}{\sqrt{\pi}}-\frac{2b\,\mathrm{e}^c\ln(x)}{\sqrt{\pi}}+b\,\mathrm{e}^c\,\mathrm{erfi}(bx)\sqrt{\pi}$$

command

`integrate(exp(b**2*x**2+c)*erfc(b*x)/x**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2b^3x^2e^c{}_2F_2\left(\begin{matrix}1,1\\2,\frac{5}{2}\end{matrix}\middle|b^2x^2\right)}{3\sqrt{\pi}}-\frac{be^c\log\left(b^2x^2\right)}{\sqrt{\pi}}-i\sqrt{\pi}\,be^c\,\mathrm{erf}\,(ibx)-\frac{e^ce^{b^2x^2}}{x}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.16 Problem number 177

$$\int \frac{e^{c+b^2x^2}\text{Erfc}(bx)}{x^4}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{e}^{b^2x^2+c}\mathrm{erfc}(bx)}{3x^3}-\frac{2b^2\mathrm{e}^{b^2x^2+c}\mathrm{erfc}(bx)}{3x}+\frac{b\,\mathrm{e}^c}{3x^2\sqrt{\pi}}-\frac{4b^5\mathrm{e}^c x^2\,\mathrm{hypergeom}\left([1,1],\left[\frac{3}{2},2\right],b^2x^2\right)}{3\sqrt{\pi}}-\frac{4b^3\mathrm{e}^c\ln(x)}{3\sqrt{\pi}}+\frac{2b^3\mathrm{e}^c\,\mathrm{erfi}(bx)\sqrt{\pi}}{3}$$

command

`integrate(exp(b**2*x**2+c)*erfc(b*x)/x**4,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{b^3G_{3,2}^{1,3}\left(\begin{matrix}2,\frac{5}{2},1 & \\ 2 & 0\end{matrix}\middle|\frac{1}{b^2x^2}\right)e^c}{2\pi}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

95.17 Problem number 210

$$\int \frac{\text{Erfi}(bx)}{x}\,dx$$

Optimal antiderivative

$$\frac{2bx\,\text{hypergeom}\left(\left[\frac{1}{2},\frac{1}{2}\right],\left[\frac{3}{2},\frac{3}{2}\right],b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(erfi(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2bx\,{}_2F_2\left(\left.\begin{matrix}\frac{1}{2},\frac{1}{2}\\ \frac{3}{2},\frac{3}{2}\end{matrix}\right| b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.18 Problem number 270

$$\int e^{-b^2x^2}x^5\text{Erfi}(bx)\,dx$$

Optimal antiderivative

$$-\frac{\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}}{b^6}-\frac{x^2\,\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}}{b^4}-\frac{x^4\,\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}}{2b^2}+\frac{2x}{b^5\sqrt{\pi}}+\frac{2x^3}{3b^3\sqrt{\pi}}+\frac{x^5}{5b\sqrt{\pi}}$$

command

```
integrate(x**5*erfi(b*x)/exp(b**2*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases}\frac{x^5}{5\sqrt{\pi}\,b}-\frac{x^4e^{-b^2x^2}\,\text{erfi}\,(bx)}{2b^2}+\frac{2x^3}{3\sqrt{\pi}\,b^3}-\frac{x^2e^{-b^2x^2}\,\text{erfi}\,(bx)}{b^4}+\frac{2x}{\sqrt{\pi}\,b^5}-\frac{e^{-b^2x^2}\,\text{erfi}\,(bx)}{b^6} & \text{for } b\neq 0\\ 0 & \text{otherwise}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

95.19 Problem number 273

$$\int \frac{e^{-b^2x^2}\operatorname{Erfi}(bx)}{x}\,dx$$

Optimal antiderivative

$$\frac{2bx\,\mathrm{hypergeom}\left(\left[\frac{1}{2},1\right],\left[\frac{3}{2},\frac{3}{2}\right],-b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(erfi(b*x)/exp(b**2*x**2)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2bx\,{}_2F_2\left(\begin{matrix}\frac{1}{2},1\\ \frac{3}{2},\frac{3}{2}\end{matrix}\middle|-b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.20 Problem number 274

$$\int \frac{e^{-b^2x^2}\operatorname{Erfi}(bx)}{x^3}\,dx$$

Optimal antiderivative

$$-\frac{\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{2x^2}-\frac{b}{x\sqrt{\pi}}-\frac{2b^3x\,\mathrm{hypergeom}\left(\left[\frac{1}{2},1\right],\left[\frac{3}{2},\frac{3}{2}\right],-b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(erfi(b*x)/exp(b**2*x**2)/x**3,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2b\,{}_2F_2\left(\begin{matrix}-\frac{1}{2},1\\ \frac{1}{2},\frac{3}{2}\end{matrix}\middle|-b^2x^2\right)}{\sqrt{\pi}\,x}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.21 Problem number 275

$$\int \frac{e^{-b^2x^2}\text{Erfi}(bx)}{x^5}\,dx$$

Optimal antiderivative

$$-\frac{\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}}{4x^4}+\frac{b^2\,\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}}{4x^2}-\frac{b}{6x^3\sqrt{\pi}}+\frac{b^3}{2x\sqrt{\pi}}+\frac{b^5x\,\text{hypergeom}\left(\left[\frac{1}{2},1\right],\left[\frac{3}{2},\frac{3}{2}\right],-b^2x^2\right)}{\sqrt{\pi}}$$

command

```
integrate(erfi(b*x)/exp(b**2*x**2)/x**5,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2b\,{}_{2}F_{2}\left(\begin{matrix}-\frac{3}{2},1\\-\frac{1}{2},\frac{3}{2}\end{matrix}\middle|-b^2x^2\right)}{3\sqrt{\pi}\,x^3}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.22 Problem number 278

$$\int e^{-b^2x^2}x^2\text{Erfi}(bx)\,dx$$

Optimal antiderivative

$$-\frac{x\,\text{erfi}\,(bx)\,\mathrm{e}^{-b^2x^2}}{2b^2}+\frac{x^2}{2b\sqrt{\pi}}+\frac{x^2\,\text{hypergeom}\left([1,1],\left[\frac{3}{2},2\right],-b^2x^2\right)}{2b\sqrt{\pi}}$$

command

```
integrate(x**2*erfi(b*x)/exp(b**2*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{bx^4\,{}_{2}F_{2}\left(\begin{matrix}1,2\\\frac{3}{2},3\end{matrix}\middle|-b^2x^2\right)}{2\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.23 Problem number 279

$$\int e^{-b^2x^2}\mathrm{Erfi}(bx)\,dx$$

Optimal antiderivative

$$\frac{b\,x^2\,\mathrm{hypergeom}\left([1,1]\,,\left[\frac{3}{2},2\right]\,,-b^2x^2\right)}{\sqrt{\pi}}$$

command

`integrate(erfi(b*x)/exp(b**2*x**2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{bx^2{}_2F_2\left(\begin{matrix}1,1\\ \frac{3}{2},2\end{matrix}\middle|-b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.24 Problem number 280

$$\int \frac{e^{-b^2x^2}\mathrm{Erfi}(bx)}{x^2}\,dx$$

Optimal antiderivative

$$-\frac{\mathrm{erfi}\left(bx\right)\mathrm{e}^{-b^2x^2}}{x}-\frac{2b^3x^2\,\mathrm{hypergeom}\left([1,1]\,,\left[\frac{3}{2},2\right]\,,-b^2x^2\right)}{\sqrt{\pi}}+\frac{2b\ln\left(x\right)}{\sqrt{\pi}}$$

command

`integrate(erfi(b*x)/exp(b**2*x**2)/x**2,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2b^3x^2{}_2F_2\left(\begin{matrix}1,1\\ 2,\frac{5}{2}\end{matrix}\middle|-b^2x^2\right)}{3\sqrt{\pi}}+\frac{b\log\left(b^2x^2\right)}{\sqrt{\pi}}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.25 Problem number 281

$$\int \frac{e^{-b^2x^2}\operatorname{Erfi}(bx)}{x^4}\,dx$$

Optimal antiderivative

$$-\frac{\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{3x^3}+\frac{2b^2\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{3x}-\frac{b}{3x^2\sqrt{\pi}}+\frac{4b^5x^2\operatorname{hypergeom}\left([1,1],\left[\frac{3}{2},2\right],-b^2x^2\right)}{3\sqrt{\pi}}-\frac{4b^3\ln(x)}{3\sqrt{\pi}}$$

command

```
integrate(erfi(b*x)/exp(b**2*x**2)/x**4,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{b^3G_{3,2}^{1,2}\left(\begin{matrix}2,1 & \frac{5}{2}\\ 2 & 0\end{matrix}\middle|\frac{e^{-2i\pi}}{b^2x^2}\right)}{2}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

95.26 Problem number 282

$$\int \frac{e^{-b^2x^2}\operatorname{Erfi}(bx)}{x^6}\,dx$$

Optimal antiderivative

$$-\frac{\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{5x^5}+\frac{2b^2\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{15x^3}-\frac{4b^4\operatorname{erfi}(bx)\,\mathrm{e}^{-b^2x^2}}{15x}-\frac{b}{10x^4\sqrt{\pi}}+\frac{2b^3}{15x^2\sqrt{\pi}}-\frac{8b^7x^2\operatorname{hypergeom}\left([1,1],\left[\frac{3}{2},2\right],-b^2x^2\right)}{15\sqrt{\pi}}+\frac{8b^5\ln(x)}{15\sqrt{\pi}}$$

command

```
integrate(erfi(b*x)/exp(b**2*x**2)/x**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{b^5G_{3,2}^{1,2}\left(\begin{matrix}3,1 & \frac{7}{2}\\ 3 & 0\end{matrix}\middle|\frac{e^{-2i\pi}}{b^2x^2}\right)}{2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

96 Test file number 205

Test folder name:

`test_cases/8_Special_functions/205_8.2_Fresnel_integral_functions`

96.1 Problem number 9

$$\int \frac{S(bx)}{x}\,dx$$

Optimal antiderivative

$$\frac{ibx\,\text{hypergeom}\left(\left[\frac{1}{2},\frac{1}{2}\right],\left[\frac{3}{2},\frac{3}{2}\right],-\frac{ib^2\pi\,x^2}{2}\right)}{2}-\frac{ibx\,\text{hypergeom}\left(\left[\frac{1}{2},\frac{1}{2}\right],\left[\frac{3}{2},\frac{3}{2}\right],\frac{ib^2\pi\,x^2}{2}\right)}{2}$$

command

```
integrate(fresnels(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\pi b^3x^3\Gamma^2\left(\frac{3}{4}\right)\,{}_2F_3\left(\begin{matrix}\frac{3}{4},\frac{3}{4}\\ \frac{3}{2},\frac{7}{4},\frac{7}{4}\end{matrix}\middle|-\frac{\pi^2b^4x^4}{16}\right)}{32\Gamma^2\left(\frac{7}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

96.2 Problem number 71

$$\int x^8S(bx)\sin\left(\frac{1}{2}b^2\pi x^2\right)\,dx$$

Optimal antiderivative

$$\frac{105x^2}{4b^7\pi^4}-\frac{7x^6}{12b^3\pi^2}+\frac{55x^2\cos\left(b^2\pi\,x^2\right)}{4b^7\pi^4}-\frac{x^6\cos\left(b^2\pi\,x^2\right)}{4b^3\pi^2}+\frac{35x^3\cos\left(\frac{b^2\pi\,x^2}{2}\right)\mathrm{S}(bx)}{b^6\pi^3}$$
$$-\frac{x^7\cos\left(\frac{b^2\pi\,x^2}{2}\right)\mathrm{S}(bx)}{b^2\pi}+\frac{105\mathrm{S}(bx)^2}{2b^9\pi^4}-\frac{105x\,\mathrm{S}(bx)\sin\left(\frac{b^2\pi\,x^2}{2}\right)}{b^8\pi^4}$$
$$+\frac{7x^5\mathrm{S}(bx)\sin\left(\frac{b^2\pi\,x^2}{2}\right)}{b^4\pi^2}-\frac{40\sin\left(b^2\pi\,x^2\right)}{b^9\pi^5}+\frac{5x^4\sin\left(b^2\pi\,x^2\right)}{2b^5\pi^3}$$

command

`integrate(x**8*fresnels(b*x)*sin(1/2*b**2*pi*x**2),x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{x^7\cos\left(\frac{\pi b^2x^2}{2}\right)S(bx)}{\pi b^2} - \frac{x^6\sin^2\left(\frac{\pi b^2x^2}{2}\right)}{3\pi^2b^3} - \frac{5x^6\cos^2\left(\frac{\pi b^2x^2}{2}\right)}{6\pi^2b^3} + \frac{7x^5\sin\left(\frac{\pi b^2x^2}{2}\right)S(bx)}{\pi^2b^4} + \frac{5x^4\sin\left(\frac{\pi b^2x^2}{2}\right)\cos\left(\frac{\pi b^2x^2}{2}\right)}{\pi^3b^5} + \frac{35x^3\cos\left(\frac{\pi b^2}{2}\right.}{\pi^3b^6} \\ 0 \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

96.3 Problem number 118

$$\int \frac{\mathrm{FresnelC}(bx)}{x}\,dx$$

Optimal antiderivative

$$\frac{bx\,\mathrm{hypergeom}\left(\left[\frac{1}{2},\frac{1}{2}\right],\left[\frac{3}{2},\frac{3}{2}\right],-\frac{ib^2\pi x^2}{2}\right)}{2}+\frac{bx\,\mathrm{hypergeom}\left(\left[\frac{1}{2},\frac{1}{2}\right],\left[\frac{3}{2},\frac{3}{2}\right],\frac{ib^2\pi x^2}{2}\right)}{2}$$

command

`integrate(fresnelc(b*x)/x,x)`

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{bx\Gamma^2\left(\frac{1}{4}\right){}_2F_3\left(\begin{matrix}\frac{1}{4},\frac{1}{4}\\ \frac{1}{2},\frac{5}{4},\frac{5}{4}\end{matrix}\middle|-\frac{\pi^2b^4x^4}{16}\right)}{16\Gamma^2\left(\frac{5}{4}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

96.4 Problem number 180

$$\int x^8 \cos\left(\frac{1}{2}b^2\pi x^2\right) \operatorname{FresnelC}(bx)\, dx$$

Optimal antiderivative

$$\frac{105x^2}{4b^7\pi^4} - \frac{7x^6}{12b^3\pi^2} - \frac{55x^2\cos\left(b^2\pi\, x^2\right)}{4b^7\pi^4} + \frac{x^6\cos\left(b^2\pi\, x^2\right)}{4b^3\pi^2} - \frac{105x\cos\left(\frac{b^2\pi\, x^2}{2}\right)\operatorname{FresnelC}(bx)}{b^8\pi^4} + \frac{7x^5\cos\left(\frac{b^2\pi\, x^2}{2}\right)\operatorname{FresnelC}(bx)}{b^4\pi^2} + \frac{105\operatorname{FresnelC}(bx)^2}{2b^9\pi^4} - \frac{35x^3\operatorname{FresnelC}(bx)\sin\left(\frac{b^2\pi\, x^2}{2}\right)}{b^6\pi^3} + \frac{x^7\operatorname{FresnelC}(bx)\sin\left(\frac{b^2\pi\, x^2}{2}\right)}{b^2\pi} + \frac{40\sin\left(b^2\pi\, x^2\right)}{b^9\pi^5} - \frac{5x^4\sin\left(b^2\pi\, x^2\right)}{2b^5\pi^3}$$

command

```
integrate(x**8*cos(1/2*b**2*pi*x**2)*fresnelc(b*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} \frac{x^7\sin\left(\frac{\pi b^2x^2}{2}\right)C(bx)}{\pi b^2} - \frac{5x^6\sin^2\left(\frac{\pi b^2x^2}{2}\right)}{6\pi^2b^3} - \frac{x^6\cos^2\left(\frac{\pi b^2x^2}{2}\right)}{3\pi^2b^3} + \frac{7x^5\cos\left(\frac{\pi b^2x^2}{2}\right)C(bx)}{\pi^2b^4} - \frac{5x^4\sin\left(\frac{\pi b^2x^2}{2}\right)\cos\left(\frac{\pi b^2x^2}{2}\right)}{\pi^3b^5} - \frac{35x^3\sin\left(\frac{\pi b^2x^2}{2}\right.}{\pi^3b^6} \\ 0 \end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

97 Test file number 206

Test folder name:

`test_cases/8_Special_functions/206_8.4_Trig_integral_functions`

97.1 Problem number 6

$$\int \frac{\operatorname{Si}(bx)}{x}\, dx$$

Optimal antiderivative

$$\frac{bx\operatorname{hypergeom}\left(\left[1,1,1\right],\left[2,2,2\right],-ibx\right)}{2} + \frac{bx\operatorname{hypergeom}\left(\left[1,1,1\right],\left[2,2,2\right],ibx\right)}{2}$$

command

```
integrate(Si(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$bx{}_2F_3\left(\begin{matrix} \frac{1}{2},\frac{1}{2} \\ \frac{3}{2},\frac{3}{2},\frac{3}{2} \end{matrix}\middle| -\frac{b^2x^2}{4}\right)$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

97.2 Problem number 74

$$\int \frac{\mathrm{CosIntegral}(bx)}{x}\,dx$$

Optimal antiderivative

$$-\frac{ibx\,\mathrm{hypergeom}\left([1,1,1],[2,2,2],-ibx\right)}{2} + \frac{ibx\,\mathrm{hypergeom}\left([1,1,1],[2,2,2],ibx\right)}{2} + \mathit{EulerGamma}\ln\left(x\right) + \frac{\ln\left(bx\right)^2}{2}$$

command

```
integrate(Ci(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{b^2x^2{}_3F_4\left(\begin{matrix} 1,1,1 \\ \frac{3}{2},2,2,2 \end{matrix}\middle| -\frac{b^2x^2}{4}\right)}{8} + \frac{\log\left(b^2x^2\right)^2}{8} + \frac{\gamma\log\left(b^2x^2\right)}{2}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

98 Test file number 207

Test folder name:

```
test_cases/8_Special_functions/207_8.5_Hyperbolic_integral_functions
```

98.1 Problem number 6

$$\int \frac{\mathrm{Shi}(bx)}{x}\,dx$$

Optimal antiderivative

$$\frac{bx\,\mathrm{hypergeom}\left([1,1,1],[2,2,2],-bx\right)}{2}+\frac{bx\,\mathrm{hypergeom}\left([1,1,1],[2,2,2],bx\right)}{2}$$

command

```
integrate(Shi(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$bx\,{}_2F_3\left(\begin{matrix}\frac{1}{2},\frac{1}{2}\\ \frac{3}{2},\frac{3}{2},\frac{3}{2}\end{matrix}\middle|\,\frac{b^2x^2}{4}\right)$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

98.2 Problem number 74

$$\int \frac{\mathrm{Chi}(bx)}{x}\,dx$$

Optimal antiderivative

$$-\frac{bx\,\mathrm{hypergeom}\left([1,1,1],[2,2,2],-bx\right)}{2}+\frac{bx\,\mathrm{hypergeom}\left([1,1,1],[2,2,2],bx\right)}{2}+\mathit{EulerGamma}\ln\left(x\right)+\frac{\ln\left(bx\right)^2}{2}$$

command

```
integrate(Chi(b*x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{b^2x^2\,{}_3F_4\left(\begin{matrix}1,1,1\\ \frac{3}{2},2,2,2\end{matrix}\middle|\,\frac{b^2x^2}{4}\right)}{8}+\frac{\log\left(b^2x^2\right)^2}{8}+\frac{\gamma\log\left(b^2x^2\right)}{2}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: AttributeError

99 Test file number 208

Test folder name:

`test_cases/8_Special_functions/208_8.8_Polylogarithm_function`

99.1 Problem number 31

$$\int \frac{\mathrm{PolyLog}(2, ax^2)}{x^6}\,dx$$

Optimal antiderivative

$$-\frac{4a}{75x^3} - \frac{4a^2}{25x} + \frac{4a^{\frac{5}{2}} \operatorname{arctanh}\left(x\sqrt{a}\right)}{25} + \frac{2\ln\left(-a\,x^2+1\right)}{25x^5} - \frac{\operatorname{polylog}\left(2, a\,x^2\right)}{5x^5}$$

command

```
integrate(polylog(2,a*x**2)/x**6,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{cases} -\frac{\pi^2}{30x^5} \\ 0 \\ -\frac{12a^3x^7\sqrt{\frac{1}{a}}\log\left(x-\sqrt{\frac{1}{a}}\right)}{75x^7-\frac{75x^5}{a}} - \frac{6a^3x^7\sqrt{\frac{1}{a}}\operatorname{Li}_1\left(ax^2\right)}{75x^7-\frac{75x^5}{a}} - \frac{12a^2x^6}{75x^7-\frac{75x^5}{a}} + \frac{12a^2x^5\sqrt{\frac{1}{a}}\log\left(x-\sqrt{\frac{1}{a}}\right)}{75x^7-\frac{75x^5}{a}} + \frac{6a^2x^5\sqrt{\frac{1}{a}}\operatorname{Li}_1\left(ax^2\right)}{75x^7-\frac{75x^5}{a}} + \frac{8a}{75x^7-}\end{cases}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

100 Test file number 209

Test folder name:

`test_cases/209_Blake_problems`

100.1 Problem number 491

$$\int \frac{-1+x^6}{x^{13}\sqrt{1+x^6}}\,dx$$

Optimal antiderivative

$$\frac{(-7x^6+2)\sqrt{x^6+1}}{24x^{12}}+\frac{7\,\mathrm{arctanh}\left(\sqrt{x^6+1}\right)}{24}$$

command

```
integrate((x**6-1)/x**13/(x**6+1)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{7\log\left(-1+\frac{1}{\sqrt{x^6+1}}\right)}{48}+\frac{7\log\left(1+\frac{1}{\sqrt{x^6+1}}\right)}{48}+\frac{3}{16\cdot\left(1+\frac{1}{\sqrt{x^6+1}}\right)}-\frac{1}{48\left(1+\frac{1}{\sqrt{x^6+1}}\right)^2}+\frac{3}{16\left(-1+\frac{1}{\sqrt{x^6+1}}\right)}+\frac{1}{48\left(-1+\frac{1}{\sqrt{x^6+1}}\right)^2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

100.2 Problem number 533

$$\int \frac{\sqrt{-1+x^3}\,(-2+x^3+2x^6)}{x^{10}}\,dx$$

Optimal antiderivative

$$-\frac{2\sqrt{x^3-1}\,(3x^6+x^3-1)}{9x^9}+\frac{2\arctan\left(\sqrt{x^3-1}\right)}{3}$$

command

```
integrate((x**3-1)**(1/2)*(2*x**6+x**3-2)/x**10,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{2\,\mathrm{atan}\left(\sqrt{x^3-1}\right)}{3}-\frac{2\sqrt{x^3-1}}{3x^3}-\frac{2(x^3-1)^{\frac{3}{2}}}{9x^9}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

100.3 Problem number 555

$$\int \frac{-1+x^6}{x^{19}\sqrt{1+x^6}}\,dx$$

Optimal antiderivative

$$\frac{\sqrt{x^6+1}\,(33x^{12}-22x^6+8)}{144x^{18}}-\frac{11\,\text{arctanh}\left(\sqrt{x^6+1}\right)}{48}$$

command

```
integrate((x**6-1)/x**19/(x**6+1)**(1/2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{11\log\left(-1+\frac{1}{\sqrt{x^6+1}}\right)}{96}-\frac{11\log\left(1+\frac{1}{\sqrt{x^6+1}}\right)}{96}-\frac{7}{32\cdot\left(1+\frac{1}{\sqrt{x^6+1}}\right)}+\frac{1}{16\left(1+\frac{1}{\sqrt{x^6+1}}\right)^2}-\frac{1}{144\left(1+\frac{1}{\sqrt{x^6+1}}\right)^3}-\frac{7}{32\left(-1+\frac{1}{\sqrt{x^6+1}}\right)}-\frac{1}{16\left(-1+\frac{1}{\sqrt{x^6+1}}\right)^2}-\frac{1}{144\left(-1+\frac{1}{\sqrt{x^6+1}}\right)^3}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

100.4 Problem number 1123

$$\int \frac{\sqrt{1-4x+x^2}+(1-4x+x^2)^{3/2}}{\sqrt{1-4x+x^2}+(1-4x+x^2)^{3/2}-(1-4x+x^2)^{5/2}}\,dx$$

Optimal antiderivative

Unintegrable

command

```
integrate(((x**2-4*x+1)**(1/2)+(x**2-4*x+1)**(3/2))/((x**2-4*x+1)**(1/2)+(x**2-4*x+1)**(3/2)-
(x**2-4*x+1)**(5/2)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-2\operatorname{RootSum}\left(4400t^4-140t^2+1,\left(t\mapsto t\log\left(3080t^3-54t+x-2\right)\right)\right)$$
$$-\operatorname{RootSum}\left(4400t^4-14340t^2+400t+1,\left(t\mapsto t\log\left(\frac{102640t^3}{18179}-\frac{19200t^2}{18179}-\frac{75898t}{4081}+x+\frac{21202}{199969}\right)\right)\right)$$
$$+4\operatorname{RootSum}\left(4400t^4-1000t^2+80t-1,\left(t\mapsto t\log\left(\frac{275t^3}{7}-\frac{110t^2}{7}-\frac{305t}{28}+x+\frac{9}{28}\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: SympifyError

100.5 Problem number 1373

$$\int\frac{\sqrt[3]{-1+x^3}\,(1+x^3)}{x^7}\,dx$$

Optimal antiderivative

$$\frac{(-5x^3-3)\,(x^3-1)^{\frac{1}{3}}}{18x^6}+\frac{4\arctan\left(-\frac{\sqrt{3}}{3}+\frac{2(x^3-1)^{\frac{1}{3}}\sqrt{3}}{3}\right)\sqrt{3}}{27}+\frac{4\ln\left(1+(x^3-1)^{\frac{1}{3}}\right)}{27}-\frac{2\ln\left(1-(x^3-1)^{\frac{1}{3}}+(x^3-1)^{\frac{2}{3}}\right)}{27}$$

command

```
integrate((x**3-1)**(1/3)*(x**3+1)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{\Gamma\left(\frac{2}{3}\right){}_2F_1\left(\left.\begin{matrix}-\frac{1}{3},\frac{2}{3}\\ \frac{5}{3}\end{matrix}\right|\frac{e^{2i\pi}}{x^3}\right)}{3x^2\Gamma\left(\frac{5}{3}\right)}-\frac{\Gamma\left(\frac{5}{3}\right){}_2F_1\left(\left.\begin{matrix}-\frac{1}{3},\frac{5}{3}\\ \frac{8}{3}\end{matrix}\right|\frac{e^{2i\pi}}{x^3}\right)}{3x^5\Gamma\left(\frac{8}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

100.6 Problem number 1374

$$\int \frac{\sqrt[3]{-1+x^3}\,(-1+2x^3)}{x^7}\,dx$$

Optimal antiderivative

$$\frac{(-13x^3+3)(x^3-1)^{\frac{1}{3}}}{18x^6}+\frac{5\arctan\left(-\frac{\sqrt{3}}{3}+\frac{2(x^3-1)^{\frac{1}{3}}\sqrt{3}}{3}\right)\sqrt{3}}{27}+\frac{5\ln\left(1+(x^3-1)^{\frac{1}{3}}\right)}{27}-\frac{5\ln\left(1-(x^3-1)^{\frac{1}{3}}+(x^3-1)^{\frac{2}{3}}\right)}{54}$$

command

```
integrate((x**3-1)**(1/3)*(2*x**3-1)/x**7,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2\Gamma\left(\frac{2}{3}\right){}_2F_1\left(\begin{matrix}-\frac{1}{3},\frac{2}{3}\\ \frac{5}{3}\end{matrix}\middle|\frac{e^{2i\pi}}{x^3}\right)}{3x^2\Gamma\left(\frac{5}{3}\right)}+\frac{\Gamma\left(\frac{5}{3}\right){}_2F_1\left(\begin{matrix}-\frac{1}{3},\frac{5}{3}\\ \frac{8}{3}\end{matrix}\middle|\frac{e^{2i\pi}}{x^3}\right)}{3x^5\Gamma\left(\frac{8}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

100.7 Problem number 1473

$$\int \frac{\sqrt[3]{-1+x^3}\,(-1+2x^3)}{x^{10}}\,dx$$

Optimal antiderivative

$$\frac{(x^3-1)^{\frac{1}{3}}(13x^6-57x^3+18)}{162x^9}+\frac{13\arctan\left(-\frac{\sqrt{3}}{3}+\frac{2(x^3-1)^{\frac{1}{3}}\sqrt{3}}{3}\right)\sqrt{3}}{243}+\frac{13\ln\left(1+(x^3-1)^{\frac{1}{3}}\right)}{243}-\frac{13\ln\left(1-(x^3-1)^{\frac{1}{3}}+(x^3-1)^{\frac{2}{3}}\right)}{486}$$

command

```
integrate((x**3-1)**(1/3)*(2*x**3-1)/x**10,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{2\Gamma\left(\frac{5}{3}\right){}_2F_1\left(\begin{matrix}-\frac{1}{3},\frac{5}{3}\\\frac{8}{3}\end{matrix}\middle|\frac{e^{2i\pi}}{x^3}\right)}{3x^5\Gamma\left(\frac{8}{3}\right)}+\frac{\Gamma\left(\frac{8}{3}\right){}_2F_1\left(\begin{matrix}-\frac{1}{3},\frac{8}{3}\\\frac{11}{3}\end{matrix}\middle|\frac{e^{2i\pi}}{x^3}\right)}{3x^8\Gamma\left(\frac{11}{3}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

100.8 Problem number 2027

$$\int \frac{(-1+x^2)\,(1+x^2)^3\,\sqrt{1+2x^2+x^4}}{(1+x^4)\,(1-x^2+x^4-x^6+x^8)}\,dx$$

Optimal antiderivative

Unintegrable

command

```
integrate((x**2-1)*(x**2+1)**3*((x**2+1)**2)**(1/2)/(x**4+1)/(x**8-x**6+x**4-x**2+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\sqrt{2}\log\left(-\sqrt{2}\,x+\sqrt{(x^2+1)^2}\right)+\sqrt{2}\log\left(\sqrt{2}\,x+\sqrt{(x^2+1)^2}\right)$$
$$+\operatorname{RootSum}\left(16t^4-20t^2+5,\left(t\mapsto t\log\left(x\left(\frac{48t^5}{29}-\frac{60t^3}{29}-\frac{43t}{29}\right)+\sqrt{(x^2+1)^2}\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: SympifyError

100.9 Problem number 2178

$$\int \frac{\sqrt{1+x}\,(-1+x^4)\,\sqrt{1+\sqrt{1+x}}}{1+x^4}\,dx$$

Optimal antiderivative

Unintegrable

command

```
integrate((1+x)**(1/2)*(x**4-1)*(1+(1+x)**(1/2))**(1/2)/(x**4+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{4\left(\sqrt{x+1}+1\right)^{\frac{7}{2}}}{7}-\frac{8\left(\sqrt{x+1}+1\right)^{\frac{5}{2}}}{5}+\frac{4\left(\sqrt{x+1}+1\right)^{\frac{3}{2}}}{3}$$
$$-8\,\mathrm{RootSum}\left(73786976294838206464t^{16}+1152921504606846976t^{14}+9007199254740992t^{12}+35184372088832t^{1}\right.$$
$$-8\,\mathrm{RootSum}\left(73786976294838206464t^{16}+1152921504606846976t^{14}+2206763817411543040t^{12}-265114243689\right.$$
$$+16\,\mathrm{RootSum}\left(73786976294838206464t^{16}+1152921504606846976t^{14}+1125899906842624000t^{12}+721279627821\right.$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: SympifyError

100.10 Problem number 2179

$$\int \frac{\sqrt{1+x}\,(-1+x^4)\,\sqrt{1+\sqrt{1+x}}}{1+x^4}\,dx$$

Optimal antiderivative

Unintegrable

command

```
integrate((1+x)**(1/2)*(x**4-1)*(1+(1+x)**(1/2))**(1/2)/(x**4+1),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{4\left(\sqrt{x+1}+1\right)^{\frac{7}{2}}}{7}-\frac{8\left(\sqrt{x+1}+1\right)^{\frac{5}{2}}}{5}+\frac{4\left(\sqrt{x+1}+1\right)^{\frac{3}{2}}}{3}$$
$$-8\,\mathrm{RootSum}\left(73786976294838206464t^{16}+1152921504606846976t^{14}+9007199254740992t^{12}+35184372088832t^{1}\right.$$
$$-8\,\mathrm{RootSum}\left(73786976294838206464t^{16}+1152921504606846976t^{14}+2206763817411543040t^{12}-265114243689\right.$$
$$+16\,\mathrm{RootSum}\left(73786976294838206464t^{16}+1152921504606846976t^{14}+1125899906842624000t^{12}+721279627821\right.$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: SympifyError

101 Test file number 210

Test folder name:

`test_cases/210_Hebisch`

101.1 Problem number 327

$$\int \frac{16e^{e^x} - 16e^{e^x}\log(x)\log(\log(x))\log(\log(\log(x))) - 16e^{e^x+x}x\log(x)\log(\log(x))\log(\log(\log(x)))\log\left(\frac{\log(\log(\log(x)))}{x}\right)}{x\log(x)\log(\log(x))\log(\log(\log(x)))\log^2\left(\frac{\log(\log(\log(x)))}{x}\right)}$$

Optimal antiderivative

$$-82 - \frac{16\,\mathrm{e}^{\mathrm{e}^x}}{\ln\left(\frac{\ln(\ln(\ln(x)))}{x}\right)}$$

command

```
integrate((-16*x*exp(x)*ln(x)*exp(exp(x))*ln(ln(x))*ln(ln(ln(x)))*ln(ln(ln(ln(x)))/x)-
16*ln(x)*exp(exp(x))*ln(ln(x))*ln(ln(ln(x)))+16*exp(exp(x)))/x/ln(x)/ln(ln(x))/ln(ln(ln(x)))/
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{16e^{e^x}}{\log\left(\frac{\log\left(\log\left(\log\left(x\right)\right)\right)}{x}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.2 Problem number 355

$$\int \frac{\left(2000000x - 800000x^2 + 80000x^3 + \left(-800000x + 160000x^2\right)\log(x) + 80000x\log^2(x)\right)\log\left(e^5 + 5x\right) + \left(600000\right.}{}$$

Optimal antiderivative

$$8000x(\ln(x) + x - 5)^2\ln\left(\mathrm{e}^5 + 5x\right)^2$$

command

```
integrate((((8000*exp(5)+40000*x)*ln(x)**2+((32000*x-64000)*exp(5)+160000*x**2-320000*x)*ln(x
144000*x+120000)*exp(5)+120000*x**3-720000*x**2+600000*x)*ln(exp(5)+5*x)**2+(80000*x*ln(x)**2
800000*x)*ln(x)+80000*x**3-800000*x**2+2000000*x)*ln(exp(5)+5*x))/(exp(5)+5*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\left(8000x^3 + 16000x^2\log\left(x\right) - 80000x^2 + 8000x\log\left(x\right)^2 - 80000x\log\left(x\right) + 200000x\right)\log\left(5x + e^5\right)^2$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: CoercionFailed

101.3 Problem number 369

$$\int \frac{e^{-\frac{-50x+25x^2}{-56x+20x^2+4x^3+(7+x)\log(5)}}\left(3136x^2-2240x^3-48x^4+160x^5+16x^6+\left(-784x+168x^2+96x^3+8x^4\right)\log(5)+\left(\right.}{3136x^3-2240x^4-48x^5+160x^6+16x^7+\left(-784x^2+168x^3+96\right.}$$

Optimal antiderivative

$$\ln(x)\,\mathrm{e}^{-\frac{5x}{4\left(\frac{\ln(5)}{4x-8}+x\right)\left(\frac{7}{5}+\frac{x}{5}\right)}}$$

command

```
integrate((((-25*x**3-350*x**2+350*x)*ln(5)+100*x**5-400*x**4+400*x**3)*ln(x)+(x**2+14*x+49)*
784*x)*ln(5)+16*x**6+160*x**5-48*x**4-2240*x**3+3136*x**2)/((x**3+14*x**2+49*x)*ln(5)**2+(8*x
784*x**2)*ln(5)+16*x**7+160*x**6-48*x**5-2240*x**4+3136*x**3)/exp((25*x**2-50*x)/((x+7)*ln(5)
56*x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$e^{-\frac{25x^2-50x}{4x^3+20x^2-56x+(x+7)\log(5)}}\log(x)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.4 Problem number 434

$$\int \frac{e^{-x}\left(-4e^x x+e^{x^3}\left(-81-18x-x^2+e^x\left(-81x-18x^2+728x^3-81x^4-45x^5-3x^6\right)\right)+e^{x^3}\left(81x+18x^2-242x\right.\right.}{81x+18x^2+x^3}$$

Optimal antiderivative

$$\frac{4}{x+9}+\left(3-x-\ln(x)\,\mathrm{e}^{-x}\right)\mathrm{e}^{x^3}$$

command

```
integrate(((-3*x**5-54*x**4-242*x**3+18*x**2+81*x)*exp(x**3)*ln(x)+((-3*x**6-45*x**5-
81*x**4+728*x**3-18*x**2-81*x)*exp(x)-x**2-18*x-81)*exp(x**3)-4*exp(x)*x)/(x**3+18*x**2+81*x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$(-xe^x+3e^x-\log(x))\,e^{-x}e^{x^3}+\frac{4}{x+9}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.5 Problem number 893

$$\int \frac{24-4x+100x^2-117x^3+12x^4+12x^5+e^{2x}\left(12x^2+3x^3\right)+e^x\left(8+4x+72x^2-30x\right.}{\left(108x^3-117x^4+12x^5+12x^6+e^{2x}\left(12x^3+3x^4\right)+e^x\left(72x^3-30x^4-12x^5\right)+\left(12x-5x^2-2x^3+e^x\left(4x+x^2\right.\right.\right.}$$

Optimal antiderivative

$$\ln\left(\ln\left(\left(3-\frac{\ln\left((4+x)\,x\right)}{x^2\left(2x-3-\mathrm{e}^x\right)}\right)^2 x\right)\right)$$

command

```
integrate((((-2*x**2-11*x-12)*exp(x)+10*x**2+31*x-36)*ln(x**2+4*x)+(3*x**3+12*x**2)*exp(x)**2
12*x**4-30*x**3+72*x**2+4*x+8)*exp(x)+12*x**5+12*x**4-117*x**3+100*x**2-4*x+24)/(((x**2+4*x)*
2*x**3-5*x**2+12*x)*ln(x**2+4*x)+(3*x**4+12*x**3)*exp(x)**2+(-12*x**5-30*x**4+72*x**3)*exp(x)
117*x**4+108*x**3)/ln((ln(x**2+4*x)**2+(6*exp(x)*x**2-12*x**3+18*x**2)*ln(x**2+4*x)+9*exp(x)*
36*x**5+54*x**4)*exp(x)+36*x**6-108*x**5+81*x**4)/(exp(x)**2*x**3+(-4*x**4+6*x**3)*exp(x)+4*x
12*x**4+9*x**3)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\log\left(\log\left(\frac{36x^6-108x^5+9x^4e^{2x}+81x^4+\left(-36x^5+54x^4\right)e^x+\left(-12x^3+6x^2e^x+18x^2\right)\log\left(x^2+4x\right)+\log\left(x^2\right.}{4x^5-12x^4+x^3e^{2x}+9x^3+\left(-4x^4+6x^3\right)e^x}\right.\right.$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.6 Problem number 1056

$$\int \frac{-1+6e^x+e^x\log\left(\frac{5e^x}{-e^5+\log(5)}\right)}{5e^x-x+e^x\log\left(\frac{5e^x}{-e^5+\log(5)}\right)}\,dx$$

Optimal antiderivative

$$\ln\left(\mathrm{e}^x\left(\ln\left(\frac{5\,\mathrm{e}^x}{\ln(5)-\mathrm{e}^5}\right)+5\right)-x\right)$$

command

```
integrate((exp(x)*ln(5*exp(x)/(ln(5)-exp(5)))+6*exp(x)-1)/(exp(x)*ln(5*exp(x)/(ln(5)-
exp(5)))+5*exp(x)-x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\log\left(-\frac{x}{x-\log\left(-\log(5)+e^5\right)+\log(5)+5+i\pi}+e^x\right) \\ +\log\left(x-\log\left(-\log(5)+e^5\right)+\log(5)+5+i\pi\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.7 Problem number 1394

$$\int \frac{e^{-e^{9-x}}\left(-40+10x+e^{9-x}\left(122-80x+10x^2\right)+e^{9-x}\left(61-40x+5x^2\right)\log\left(61-40x+5x^2\right)\right)}{61-40x+5x^2}\,dx$$

Optimal antiderivative

$$\left(\ln\left(-19+5(4-x)^2\right)+2\right)\mathrm{e}^{-\mathrm{e}^{9-x}}$$

command

```
integrate(((5*x**2-40*x+61)*exp(9-x)*ln(5*x**2-40*x+61)+(10*x**2-80*x+122)*exp(9-x)+10*x-
40)/(5*x**2-40*x+61)/exp(exp(9-x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\left(\log\left(5x^2-40x+61\right)+2\right)e^{-e^{9-x}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.8 Problem number 1777

$$\int \frac{e^{-x}\left(3e^{1+x}+x^{\frac{1}{3}e^{-x}(-2x+2e^x x)}\left(-6x+e^x(3+6x)+\left(-8x+8e^x x+6x^2\right)\log(x)+\left(-2x+2e^x x+2x^2\right)\log^2(x)\right)\right)}{3x}$$

Optimal antiderivative

$$\left(\mathrm{e}+\mathrm{e}^{\ln(x)\left(\frac{2x}{3}-\frac{2x\,\mathrm{e}^{-x}}{3}\right)}\right)(3+\ln(x))$$

command

```
integrate(1/3*(((2*exp(x)*x+2*x**2-2*x)*ln(x)**2+(8*exp(x)*x+6*x**2-8*x)*ln(x)+(6*x+3)*exp(x)
6*x)*exp(1/3*(2*exp(x)*x-2*x)*ln(x)/exp(x))+3*exp(1)*exp(x))/exp(x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$(\log(x)+3)\,e^{\left(\frac{2xe^x}{3}-\frac{2x}{3}\right)e^{-x}\log(x)}+e\log(x)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.9 Problem number 1847

$$\int \frac{e^{-\frac{5-e^x+x+\log(4)}{x}} \log^{-1+e^{-\frac{5-e^x+x+\log(4)}{x}}}(x) \left(x+(5+e^x(-1+x)+\log(4)) \log(x) \log(\log(x))\right)}{x^2} \, dx$$

Optimal antiderivative

$$\mathrm{e}^{\ln(\ln(x))\mathrm{e}^{-\frac{-\mathrm{e}^x+2\ln(2)+5+x}{x}}}$$

command

```
integrate((((-1+x)*exp(x)+2*ln(2)+5)*ln(x)*ln(ln(x))+x)*exp(ln(ln(x))/exp((-exp(x)+2*ln(2)+5+
exp(x)+2*ln(2)+5+x)/x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$e^{e^{-\frac{x-e^x+2\log(2)+5}{x}} \log(\log(x))}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.10 Problem number 2047

$$\int \frac{-8x\log(9-x)\log(x)+\left(-36+4x+(36-4x)\log^2(9-x)+\left(-36+4x+(36-4x)\log^2(9-x)\right)\log(x)\right)\log\left(-\right.}{9-x+(-9+x)\log^2(9-x)}$$

Optimal antiderivative

$$-4x\ln\left(\ln(9-x)^2-1\right)\ln(x)-5$$

command

```
integrate(((((-4*x+36)*ln(9-x)**2+4*x-36)*ln(x)+(-4*x+36)*ln(9-x)**2+4*x-36)*ln(ln(9-
x)**2-1)-8*x*ln(9-x)*ln(x))/((x-9)*ln(9-x)**2+9-x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$(-4x\log(x)-9)\log\left(\log(9-x)^2-1\right)+9\log\left(\log(9-x)^2-1\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.11 Problem number 2096

$$\int \frac{e^{50}(-8-4x)-18x-16x^2-4x^3+e^{25}(-16-24x-8x^2)+(e^{50}(-4-2x)-8x-8x^2-2x^3+e^{25}(-8-12x}{2e^{50}+4x+2x^2+e^{25}(}$$

Optimal antiderivative

$$\left(\ln\left(x\left(4+2\ln\left(10+\frac{20}{\mathrm{e}^{25}+x}\right)\right)\right)-5-x\right)x$$

command

```
integrate((((exp(25)**2+(2+2*x)*exp(25)+x**2+2*x)*ln((10*exp(25)+10*x+20)/(exp(25)+x))+2*exp(
2*x-4)*exp(25)**2+(-4*x**2-12*x-8)*exp(25)-2*x**3-8*x**2-8*x)*ln((10*exp(25)+10*x+20)/(exp(25
4*x-8)*exp(25)**2+(-8*x**2-24*x-16)*exp(25)-4*x**3-16*x**2-18*x)/((exp(25)**2+(2+2*x)*exp(25)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-x^2-5x+\left(x+\frac{1}{6}+\frac{e^{25}}{6}\right)\log\left(2x\log\left(\frac{10x+20+10e^{25}}{x+e^{25}}\right)+4x\right)$$
$$-\frac{(1+e)\left(-e^3-e+1+e^2+e^4\right)\left(-e^{15}-e^5+1+e^{10}+e^{20}\right)\log(x)}{6}$$
$$-\frac{(1+e)\left(-e^3-e+1+e^2+e^4\right)\left(-e^{15}-e^5+1+e^{10}+e^{20}\right)\log\left(\log\left(\frac{10x+20+10e^{25}}{x+e^{25}}\right)+2\right)}{6}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: CoercionFailed

101.12 Problem number 2165

$$\int \frac{18-12x+2x^2+x^2\left(i\pi+\log\left(\frac{25}{4}\right)\right)+\left(-9+6x-x^2\right)\log\left(x^2\right)}{\left(3x^2-x^3\right)\left(i\pi+\log\left(\frac{25}{4}\right)\right)+\left(9x-6x^2+x^3\right)\log\left(x^2\right)}\,dx$$

Optimal antiderivative

$$\ln\left(\frac{\ln\left(\frac{25}{4}\right)+i\pi}{-3x+9}+\frac{\ln\left(x^2\right)}{3x}\right)$$

command

```
integrate(((-x**2+6*x-9)*ln(x**2)+x**2*(ln(25/4)+I*pi)+2*x**2-12*x+18)/((x**3-6*x**2+9*x)*ln(
x**3+3*x**2)*(ln(25/4)+I*pi)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\log(x)+\log\left(\log\left(x^2\right)+\frac{-2x\log(5)+2x\log(2)-i\pi x}{x-3}\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.13 Problem number 2406

$$\int \frac{e^{\frac{1}{5}x^2\log(x)\log\left(\log\left(-\frac{x}{20+5x}\right)\right)}\left(4x\log(x)+\left(\left(4x+x^2\right)\log\left(-\frac{x}{20+5x}\right)+\left(8x+2x^2\right)\log(x)\log\left(-\frac{x}{20+5x}\right)\right)\log\left(\log\left(-\right.\right.\right.}{(20+5x)\log\left(-\frac{x}{20+5x}\right)}$$

Optimal antiderivative

$$e^{\frac{x^2\ln\left(\ln\left(\frac{x}{-5x-20}\right)\right)\ln(x)}{5}}$$

command

integrate((((2*x2+8*x)*ln(-x/(20+5*x))*ln(x)+(x**2+4*x)*ln(-x/(20+5*x)))*ln(ln(-x/(20+5*x)))+4*x*ln(x))*exp(1/5*x**2*ln(x)*ln(ln(-x/(20+5*x))))/(20+5*x)/ln(-x/(20+5*x)),x)**

Sympy 1.10.1 under Python 3.10.4 output

$$e^{\frac{x^2\log(x)\log\left(\log\left(-\frac{x}{5x+20}\right)\right)}{5}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.14 Problem number 2485

$$\int \frac{\left(\frac{3+3x}{x}\right)^{\frac{e^{e^4x}(5-x)}{x}}\left(\left(2x+2x^2\right)\log\left(\frac{3+3x}{x}\right)+e^{e^4x}\log\left(\frac{3+3x}{x}\right)\left(-10+2x+\left(-10-10x+e^4\left(10x+8x^2-2x^3\right)\right)\log\left(\right.\right.\right.}{\left(x+x^2\right)\log\left(\frac{3+3x}{x}\right)}$$

Optimal antiderivative

$$2\,\mathrm{e}^{\frac{\mathrm{e}^{x\,\mathrm{e}^4+\ln\left(\ln\left(\frac{3}{x}+3\right)\right)}(5-x)}{x}}x+4$$

command

integrate(((((-2*x3+8*x**2+10*x)*exp(4)-10*x-10)*ln((3*x+3)/x)+2*x-10)*exp(ln(ln((3*x+3)/x)
x)*exp(ln(ln((3*x+3)/x))+x*exp(4))/x)/(x**2+x)/ln((3*x+3)/x),x)**

Sympy 1.10.1 under Python 3.10.4 output

$$2xe^{\frac{(5-x)e^{xe^4}\log\left(\frac{3x+3}{x}\right)}{x}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.15 Problem number 2524

$$\int \frac{625000x - 625000x^4 + e^{13}\left(4 - 2x + 8x^3 - 4x^4\right) + e^5\left(-2500 + 1250x - 5000x^3 + 2500x^4 + e^3\left(-1000x + 1000x\right.\right.}{}$$

Optimal antiderivative

$$\left(\ln\left(x^2 - \frac{1}{x}\right) + \left(5 - \ln\left(-2 + x\right)\right)^4 \mathrm{e}^{-5} - \mathrm{e}^3\right)^2$$

command

```
integrate((((8*x**4-8*x)*exp(5)*ln(-2+x)**3+(-120*x**4+120*x)*exp(5)*ln(-2+x)**2+(600*x**4-
600*x)*exp(5)*ln(-2+x)+(4*x**4-8*x**3+2*x-4)*exp(5)**2+(-1000*x**4+1000*x)*exp(5))*ln((x**3-
1)/x)+(8*x**4-8*x)*ln(-2+x)**7+(-280*x**4+280*x)*ln(-2+x)**6+(4200*x**4-4200*x)*ln(-
2+x)**5+((4*x**4-8*x**3+2*x-4)*exp(5)-35000*x**4+35000*x)*ln(-2+x)**4+(((-8*x**4+8*x)*exp(3)-
80*x**4+160*x**3-40*x+80)*exp(5)+175000*x**4-175000*x)*ln(-2+x)**3+(((120*x**4-120*x)*exp(3)+
1200*x**3+300*x-600)*exp(5)-525000*x**4+525000*x)*ln(-2+x)**2+(((-600*x**4+600*x)*exp(3)-
2000*x**4+4000*x**3-1000*x+2000)*exp(5)+875000*x**4-875000*x)*ln(-2+x)+(-4*x**4+8*x**3-
2*x+4)*exp(3)*exp(5)**2+((1000*x**4-1000*x)*exp(3)+2500*x**4-5000*x**3+1250*x-2500)*exp(5)-
625000*x**4+625000*x)/(x**5-2*x**4-x**2+2*x)/exp(5)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}
&\frac{\left(2\log\left(x-2\right)^4 - 40\log\left(x-2\right)^3 + 300\log\left(x-2\right)^2 - 1000\log\left(x-2\right)\right)\log\left(\frac{x^3-1}{x}\right)}{e^5} \\
&+ \log\left(\frac{x^3-1}{x}\right)^2 + \frac{\log\left(x-2\right)^8}{e^{10}} - \frac{40\log\left(x-2\right)^7}{e^{10}} + \frac{700\log\left(x-2\right)^6}{e^{10}} \\
&- \frac{7000\log\left(x-2\right)^5}{e^{10}} + \frac{\left(43750-2e^8\right)\log\left(x-2\right)^4}{e^{10}} + \frac{\left(-175000+40e^8\right)\log\left(x-2\right)^3}{e^{10}} \\
&+ \frac{\left(437500-300e^8\right)\log\left(x-2\right)^2}{e^{10}} + \frac{\left(-1250+2e^8\right)\log\left(x + \frac{-2e^{13}+1250e^5+\left(-1250+2e^8\right)e^5}{-500e^8-625e^5+312500+e^{13}}\right)}{e^5} \\
&+ \frac{\left(-625000+1000e^8\right)\log\left(x + \frac{-2e^{13}-625000+1250e^5+1000e^8}{-500e^8-625e^5+312500+e^{13}}\right)}{e^{10}} \\
&- \frac{2\left(-5+e^2\right)\left(5+e^2\right)\left(25+e^4\right)\log\left(x^3-1\right)}{e^5}
\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.16 Problem number 2856

$$\int \frac{3x^3 + 4^{25x}\left(-2x^2 - 25x^3\log(4)\right) + e^{2\log^2(x)}\left(x - 25\ 4^{25x}x\log(4) + \left(-4^{1+25x} + 4x\right)\log(x)\right) + e^{\log^2(x)}\left(4x^2 + 4^{25x}\left(\right.\right.}{x}$$

Optimal antiderivative

$$-\left(x - \mathrm{e}^{50x\ln(2)}\right)\left(x + \mathrm{e}^{\ln(x)^2}\right)\left(-x - \mathrm{e}^{\ln(x)^2}\right)$$

command

```
integrate((((-4*exp(50*x*ln(2))+4*x)*ln(x)-50*x*ln(2)*exp(50*x*ln(2))+x)*exp(ln(x)**2)**2+((-
4*x*exp(50*x*ln(2))+4*x**2)*ln(x)+(-100*x**2*ln(2)-2*x)*exp(50*x*ln(2))+4*x**2)*exp(ln(x)**2)-
50*x**3*ln(2)-2*x**2)*exp(50*x*ln(2))+3*x**3)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$x^3 + 2x^2e^{\log(x)^2} + xe^{2\log(x)^2} + \left(-x^2 - 2xe^{\log(x)^2} - e^{2\log(x)^2}\right)e^{50x\log(2)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.17 Problem number 3015

$$\int \frac{-562500 - 130000\log(x) - 10200\log^2(x) - 336\log^3(x) - 4\log^4(x) + \left(-337500 - 64500\log(x) - 3540\log^2(x) - \right.}{}$$

Optimal antiderivative

$$-\frac{1}{4} - (\ln(x) + 25 + 5\ln(\ln(x) + 4))^4$$

command

```
integrate(((-500*ln(x)-4500)*ln(ln(x)+4)**3+(-300*ln(x)**2-10200*ln(x)-67500)*ln(ln(x)+4)**2+(-
60*ln(x)**3-3540*ln(x)**2-64500*ln(x)-337500)*ln(ln(x)+4)-4*ln(x)**4-336*ln(x)**3-
10200*ln(x)**2-130000*ln(x)-562500)/(x*ln(x)+4*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}&(-500\log(x) - 12500)\log(\log(x) + 4)^3 \\ &+ \left(-150\log(x)^2 - 7500\log(x) - 93750\right)\log(\log(x) + 4)^2 \\ &+ \left(-20\log(x)^3 - 1500\log(x)^2 - 37500\log(x)\right)\log(\log(x) + 4) - \log(x)^4 - 100\log(x)^3 \\ &- 3750\log(x)^2 - 62500\log(x) - 625\log(\log(x) + 4)^4 - 312500\log(\log(x) + 4)\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.18 Problem number 3068

$$\int \frac{6 + e^{3+x}(-1+x) + \left(6x - e^{3+x}x - x^2\right)\log\left(\frac{3x}{-6+e^{3+x}+x}\right)\log\left(\log\left(\frac{3x}{-6+e^{3+x}}\right.\right.}{\left(-6x^2 + e^{3+x}x^2 + x^3\right)\log\left(\frac{3x}{-6+e^{3+x}+x}\right)\log\left(\log\left(\frac{3x}{-6+e^{3+x}+x}\right)\right) + \left(-6x + e^{3+x}x + x^2\right)\log\left(\frac{3x}{-6+e^{3+x}+x}\right)\log\left(\log\right.}$$

Optimal antiderivative

$$\ln\left(\frac{2}{x + \ln\left(\ln\left(\ln\left(\frac{3x}{\mathrm{e}^{3+x}+x-6}\right)\right)\right)}\right)$$

command

```
integrate(((-exp(3+x)*x-x**2+6*x)*ln(3*x/(exp(3+x)+x-6))*ln(ln(3*x/(exp(3+x)+x-6)))+(-
1+x)*exp(3+x)+6)/((exp(3+x)*x+x**2-6*x)*ln(3*x/(exp(3+x)+x-6))*ln(ln(3*x/(exp(3+x)+x-
6)))*ln(ln(ln(3*x/(exp(3+x)+x-6))))+(x**2*exp(3+x)+x**3-6*x**2)*ln(3*x/(exp(3+x)+x-
6))*ln(ln(3*x/(exp(3+x)+x-6)))),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\log\left(x + \log\left(\log\left(\log\left(\frac{3x}{x + e^{x+3} - 6}\right)\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.19 Problem number 3362

$$\int \frac{1728x^2 + 864ex^2 - 864x^3 + e^{2x}\left(12x^2 + 12x^3 - 6x^4 + e\left(6x^2 + 6x^3\right)\right) + e^x\left(288x^2 + 72x^3 - 72x^4 + e\left(144x^2 + 72\right.\right.}{}$$

Optimal antiderivative

$$3\left(\ln(x)^2 - (12 + \mathrm{e}^x)\left(\ln(3 - x + \mathrm{e}) + x\right)\right)^2$$

command

```
integrate((((6*x*exp(1)-6*x**2+18*x)*exp(x)**2+(72*x*exp(1)-72*x**2+216*x)*exp(x))*ln(3-
x+exp(1))**2+((-6*x*exp(1)+6*x**2-18*x)*exp(x)*ln(x)**2+((-12*exp(1)+12*x-36)*exp(x)-
144*exp(1)+144*x-432)*ln(x)+((12*x**2+6*x)*exp(1)-12*x**3+30*x**2+12*x)*exp(x)**2+((144*x**2+
144*x**3+288*x**2+288*x)*exp(x)+864*x*exp(1)-864*x**2+1728*x)*ln(3-x+exp(1))+(12*exp(1)-
12*x+36)*ln(x)**3+(((-6*x**2-6*x)*exp(1)+6*x**3-12*x**2-12*x)*exp(x)-72*x*exp(1)+72*x**2-
144*x)*ln(x)**2+((-12*x*exp(1)+12*x**2-36*x)*exp(x)-144*x*exp(1)+144*x**2-432*x)*ln(x)+((6*x*
6*x**4+12*x**3+12*x**2)*exp(x)**2+((72*x**3+144*x**2)*exp(1)-72*x**4+72*x**3+288*x**2)*exp(x)
864*x**3+1728*x**2)/(x*exp(1)-x**2+3*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}&432x^2 - 72x\log(x)^2 + \left(864x - 72\log(x)^2\right)\log(-x+e+3)\\&+\left(3x^2 + 6x\log(-x+e+3) + 3\log(-x+e+3)^2\right)e^{2x}\\&+\left(72x^2 - 6x\log(x)^2 + 144x\log(-x+e+3) - 6\log(x)^2\log(-x+e+3)\right.\\&\left.+72\log(-x+e+3)^2\right)e^x + 3\log(x)^4 + 432\log(-x+e+3)^2\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.20 Problem number 3434

$$\begin{aligned}&\int \frac{1}{2}e^{8-2x}\left(64x - 112x^2 + 40x^3 - 4x^4 + e^{-4+x}\left(16 - 24x + 4x^2\right) + 3^{2x}(-1+\log(3))\right.\\&\left.+3^x\left(8 - 20x + 4x^2 + \left(8x - 2x^2\right)\log(3) + e^{-4+x}(-2+2\log(3))\right)\right)\,dx\end{aligned}$$

Optimal antiderivative

$$\left(1 + \left(\frac{\mathrm{e}^{x\ln(3)}}{2} - x^2 + 4x\right)\mathrm{e}^{4-x}\right)^2$$

command

```
integrate(1/2*((ln(3)-1)*exp(x*ln(3))**2+((2*ln(3)-2)*exp(x-4)+(-2*x**2+8*x)*ln(3)+4*x**2-
20*x+8)*exp(x*ln(3))+(4*x**2-24*x+16)*exp(x-4)-4*x**4+40*x**3-112*x**2+64*x)/exp(x-
4)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\begin{aligned}&x^4e^8e^{-2x} - 8x^3e^8e^{-2x} - 2x^2e^4e^{-x} - x^2e^8e^{-2x}e^{x\log(3)} + 16x^2e^8e^{-2x}\\&+8xe^4e^{-x} + 4xe^8e^{-2x}e^{x\log(3)} + e^4e^{-x}e^{x\log(3)} + \frac{e^8e^{-2x}e^{2x\log(3)}}{4}\end{aligned}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.21 Problem number 3539

$$\int \frac{e^{-x^2}x\left(2x^2+e^{2+2e^{e^3}}\left(-2+2x^2\right)+e^2\left(-8+6x^2+2x^4\right)+e^{e^{e^3}}\left(-2x+e^2\left(4x-4x^3\right)\right)\right)+e^{-x^2}x\left(8-6x^2-2x^4+\right.}{4+e^{2e^{e^3}}-2e^{e^{e^3}}x+x^2}$$

Optimal antiderivative

$$\mathrm{e}^{\ln(x)-x^2}\left(\ln\left(\left(\mathrm{e}^{\mathrm{e}^{\mathrm{e}^3}}-x\right)^2+4\right)-\mathrm{e}^2\right)x$$

command

```
integrate((((-2*x**2+2)*exp(exp(exp(3)))**2+(4*x**3-4*x)*exp(exp(exp(3)))-2*x**4-6*x**2+8)*ex
x**2)*ln(exp(exp(exp(3)))**2-2*x*exp(exp(exp(3)))+x**2+4)+((2*x**2-2)*exp(2)*exp(exp(exp(3)))
4*x**3+4*x)*exp(2)-2*x)*exp(exp(exp(3)))+(2*x**4+6*x**2-8)*exp(2)+2*x**2)*exp(ln(x)-
x**2))/(exp(exp(exp(3)))**2-2*x*exp(exp(exp(3)))+x**2+4),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\left(x^2\log\left(x^2-2xe^{e^{e^3}}+4+e^{2e^{e^3}}\right)-x^2e^2\right)e^{-x^2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.22 Problem number 3683

$$\int \frac{-4x-4e^xx^2-8x^3+\left(4+4e^xx+8x^2\right)\log(x)+\left(e^x(2-2x)+2x^2-2x^3+(2-2x)\log(x)\right)\log\left(e^x+x^2+\log(\right.}{\left(-e^xx^2-x^4+\left(e^xx-x^2+x^3\right)\log(x)+x\log^2(x)\right)\log\left(e^x+x^2+\log(x)\right)\log\left(\log\left(e^x+x^2\right.\right.}$$

Optimal antiderivative

$$\ln\left((\ln(x)-x)^2\ln\left(\ln\left(\ln(x)+x^2+\mathrm{e}^x\right)\right)^4\right)$$

command

```
integrate((((2-2*x)*ln(x)+(2-2*x)*exp(x)-2*x**3+2*x**2)*ln(ln(x)+x**2+exp(x))*ln(ln(ln(x)+x**
4*exp(x)*x**2-8*x**3-4*x)/(x*ln(x)**2+(exp(x)*x+x**3-x**2)*ln(x)-exp(x)*x**2-x**4)/ln(ln(x)+x
```

Sympy 1.10.1 under Python 3.10.4 output

$$2\log\left(-x+\log(x)\right)+4\log\left(\log\left(\log\left(x^2+e^x+\log(x)\right)\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.23 Problem number 3697

$$\int \frac{\left(-32x^2+16x^3+e^2\left(8x-6x^2\right)+\left(-16x^2+4x^3+e^2\left(8x-2x^2\right)\right)\log\left(32x^2-16x^3+2x^4+e^2\left(-16x+8x^2-x^3\right.\right.}{\left(e^2\left(-4\right.\right.}$$

Optimal antiderivative

$$x^2\ln\left(\frac{5}{x\ln\left(x\left(4-x\right)^2\left(2x-\mathrm{e}^2\right)\right)}\right)^2$$

command

```
integrate((((2*x**2-8*x)*exp(2)-4*x**3+16*x**2)*ln((-x**3+8*x**2-16*x)*exp(2)+2*x**4-
16*x**3+32*x**2)*ln(5/x/ln((-x**3+8*x**2-16*x)*exp(2)+2*x**4-16*x**3+32*x**2))**2+(((-
2*x**2+8*x)*exp(2)+4*x**3-16*x**2)*ln((-x**3+8*x**2-16*x)*exp(2)+2*x**4-16*x**3+32*x**2)+(-
6*x**2+8*x)*exp(2)+16*x**3-32*x**2)*ln(5/x/ln((-x**3+8*x**2-16*x)*exp(2)+2*x**4-16*x**3+32*x*
4)*exp(2)-2*x**2+8*x)/ln((-x**3+8*x**2-16*x)*exp(2)+2*x**4-16*x**3+32*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$x^2\log\left(\frac{5}{x\log\left(2x^4-16x^3+32x^2+\left(-x^3+8x^2-16x\right)e^2\right)}\right)^2$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: CoercionFailed

101.24 Problem number 4243

$$\int \frac{4-3x^2-3x^3+6x^5-2x^6+\left(4x-4x^3+2x^4\right)\log(x)+\left(-x^2+x^5-x^3\log(x)\right)\log}{\left(4x+x^2+4x^3-5x^4-x^5-4x^6+x^7+\left(4x^2+x^3+4x^4-x^5\right)\log(x)+\left(x^3-x^6+x^4\log(x)\right)\log\left(\frac{1-x^3+x\log(x)}{x}\right.\right.}$$

Optimal antiderivative

$$\frac{1}{\ln\left(\left(\ln\left(\ln\left(x\right)+\frac{1}{x}-x^2\right)-x+4\right)x+\frac{4+x}{x}\right)}$$

command

```
integrate(((-x**3*ln(x)+x**5-x**2)*ln((x*ln(x)-x**3+1)/x)+(2*x**4-4*x**3+4*x)*ln(x)-
2*x**6+6*x**5-3*x**3-3*x**2+4)/((x**4*ln(x)-x**6+x**3)*ln((x*ln(x)-x**3+1)/x)+(-x**5+4*x**4+x
4*x**6-x**5-5*x**4+4*x**3+x**2+4*x)/ln((x**2*ln((x*ln(x)-x**3+1)/x)-x**3+4*x**2+x+4)/x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{1}{\log\left(\frac{-x^3+x^2\log\left(\frac{-x^3+x\log(x)+1}{x}\right)+4x^2+x+4}{x}\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.25 Problem number 4408

$$\int \frac{\left(\frac{x}{\log\left(\frac{3}{4}\log\left(\frac{x}{2}\right)\right)}\right)^{\frac{1}{-1+e^2}}\left(-1+\log\left(\frac{x}{2}\right)\log\left(\frac{3}{4}\log\left(\frac{x}{2}\right)\right)\right)}{(-x+e^2x)\log\left(\frac{x}{2}\right)\log\left(\frac{3}{4}\log\left(\frac{x}{2}\right)\right)}\,dx$$

Optimal antiderivative

$$\mathrm{e}^{\frac{\ln\left(\frac{x}{\ln\left(\frac{3\ln\left(\frac{x}{2}\right)}{4}\right)}\right)}{\mathrm{e}^2-1}}$$

command

```
integrate((ln(1/2*x)*ln(3/4*ln(1/2*x))-1)*exp(ln(x/ln(3/4*ln(1/2*x)))/(exp(2)-1))/(exp(2)*x-
x)/ln(1/2*x)/ln(3/4*ln(1/2*x)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\left(\frac{x}{\log\left(\frac{3\log\left(\frac{x}{2}\right)}{4}\right)}\right)^{\frac{1}{-1+e^2}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.26 Problem number 4741

$$\int \frac{-2x-2x^2+e^x(2+2x)+e^x(-2-2x)\log\left(\frac{1+x}{5}\right)+\log\left(\frac{x^2}{3}\right)\left(-2x-2x^2+e^x\left(1+x+x^2\right)+e^x\left(-1-2x-x^2\right)\right.}{(1+x)\log\left(\frac{x^2}{3}\right)}$$

Optimal antiderivative

$$\left(\mathrm{e}^x-x-\mathrm{e}^x\ln\left(\frac{x}{5}+\frac{1}{5}\right)\right)\ln\left(\ln\left(\frac{x^2}{3}\right)\right)x$$

command

```
integrate((((-x**2-2*x-1)*exp(x)*ln(1/5*x+1/5)+(x**2+x+1)*exp(x)-2*x**2-2*x)*ln(1/3*x**2)*ln(
2-2*x)*exp(x)*ln(1/5*x+1/5)+(2+2*x)*exp(x)-2*x**2-2*x)/(1+x)/ln(1/3*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-x^2 \log\left(\log\left(\frac{x^2}{3}\right)\right) + \left(-x \log\left(\frac{x}{5}+\frac{1}{5}\right)\log\left(\log\left(\frac{x^2}{3}\right)\right) + x \log\left(\log\left(\frac{x^2}{3}\right)\right)\right)e^x$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.27 Problem number 4810

$$\int \frac{-16x+4x^2-4x^3-4e^x x^4-9x^6+\left(16+4e^x x^3+9x^5\right)\log(x)+\left(8x^3-2x^4+2x^5+2e^x x^6+\left(-8x^2-2e^x x^5\right)\mathrm{l}}{-9x^6+9x^5\log(x)}$$

Optimal antiderivative

$$x-\frac{\left(\frac{2}{x^2}-\ln\left(\left(x-\ln\left(x\right)\right)\mathrm{e}^{\mathrm{e}^x+\mathrm{e}^8}\right)\right)\left(\frac{2}{3x^2}-\frac{\ln\left(\left(x-\ln(x)\right)\mathrm{e}^{\mathrm{e}^x+\mathrm{e}^8}\right)}{3}\right)}{3}$$

command

```
integrate((((-2*x**5*exp(x)-8*x**2)*ln(x)+2*x**6*exp(x)+2*x**5-2*x**4+8*x**3)*ln((x-
ln(x))*exp(exp(x)+exp(4)**2))+(4*exp(x)*x**3+9*x**5+16)*ln(x)-4*exp(x)*x**4-9*x**6-
4*x**3+4*x**2-16*x)/(9*x**5*ln(x)-9*x**6),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$x-\frac{\log\left(\left(x-\log\left(x\right)\right)e^{e^x+e^8}\right)^2}{9}+\frac{4\log\left(\left(x-\log\left(x\right)\right)e^{e^x+e^8}\right)}{9x^2}-\frac{4}{9x^4}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.28 Problem number 4950

$$\int \frac{e^{-x}\left(x-x^2+e^x\left(x-60x^2\right)-22e^xx^2\log(x)-2e^xx^2\log^2(x)+e^{e^x}\left(10e^x+25e^{2x}x+\left(2e^x+10e^{2x}x\right)\log(x)+e^{2x}\right.\right.}{x}$$

Optimal antiderivative

$$x\,\mathrm{e}^{-x}+x+\ln(5)+2+\left(\mathrm{e}^{\mathrm{e}^x}-x^2\right)(5+\ln(x))^2$$

command

```
integrate(((x*exp(x)**2*ln(x)**2+(10*x*exp(x)**2+2*exp(x))*ln(x)+25*x*exp(x)**2+10*exp(x))*ex
2*x**2*exp(x)*ln(x)**2-22*x**2*exp(x)*ln(x)+(-60*x**2+x)*exp(x)-x**2+x)/exp(x)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-x^2\log(x)^2-10x^2\log(x)-25x^2+x+xe^{-x}+\left(\log(x)^2+10\log(x)+25\right)e^{e^x}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.29 Problem number 5263

$$\int \frac{(-16-2x)\log^2(x)+\left(16x+2x^2+2x^3\right)\log\left(\frac{8+x}{4}\right)+\log(x)\left(16+2x+2x^2+\left(-16x-2x^2\right)\log\left(\frac{8+x}{4}\right)\right)}{8x^3+x^4}\,dx$$

Optimal antiderivative

$$\left(-\frac{\ln(x)}{x}-\ln\left(2+\frac{x}{4}\right)\right)^2$$

command

```
integrate(((-2*x-16)*ln(x)**2+((-2*x**2-16*x)*ln(2+1/4*x)+2*x**2+2*x+16)*ln(x)+(2*x**3+2*x**2
```

Sympy 1.10.1 under Python 3.10.4 output

$$\log\left(\frac{x}{4}+2\right)^2+\frac{2\log(x)\log\left(\frac{x}{4}+2\right)}{x}+\frac{\log(x)^2}{x^2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.30 Problem number 5546

$$\int \frac{(20x-4x^2)\log(-5+x)\log(x)+((-80+16x)\log(-5+x)-16x\log(x))\log(\log(-5+x))+((80-16x)\log(-}{(-5x+x^2)\log(-5+x)\log(x)}$$

Optimal antiderivative

$$-4x-8\ln(5)-8(\ln(\ln(-5+x))-\ln(\ln(x)))^2$$

command

```
integrate(((16*x*ln(x)+(-16*x+80)*ln(-5+x))*ln(ln(x))+(-16*x*ln(x)+(16*x-80)*ln(-5+x))*ln(ln(
5+x))+(-4*x**2+20*x)*ln(-5+x)*ln(x))/(x**2-5*x)/ln(-5+x)/ln(x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-4x-8\log(\log(x))^2+16\log(\log(x))\log(\log(x-5))-8\log(\log(x-5))^2$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.31 Problem number 5602

$$\int \frac{e^{-x-\frac{5x^2}{30+10x+x^2}}\left(900x-300x^2-740x^3-190x^4-19x^5-x^6+e^{\frac{5x^2}{30+10x+x^2}}(900+600x+160x^2+20x^3+x^4)+e^{}\right.}{900x+600x^2+160x^3+20x^4+x^5}$$

Optimal antiderivative

$$\left(x\,\mathrm{e}^{-\frac{x^2}{\frac{(5+x)^2}{5}+1}}+\ln(x)\right)\mathrm{e}^{-x}-4$$

command

```
integrate(((-x**5-20*x**4-160*x**3-600*x**2-900*x)*exp(5*x**2/(x**2+10*x+30))*ln(x)+(x**4+20*
x**6-19*x**5-190*x**4-740*x**3-300*x**2+900*x)/(x**5+20*x**4+160*x**3+600*x**2+900*x)/exp(5*x
```

Sympy 1.10.1 under Python 3.10.4 output

$$xe^{-x}e^{-\frac{5x^2}{x^2+10x+30}}+e^{-x}\log(x)$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.32 Problem number 5723

$$\int \frac{8+8x-6x^2+4x^3-5x^4+2x^5+e^9(2+2x-x^2)+(4x^2-8x^3+3x^4)\log\left(\frac{x}{-2+x}\right)+(-8x+4x^2+2x^3-3x^4}{-24x+12x^2+6x^3-9x^4+3x^5+e^9(-6x+3x^2)+(-24+1}$$

Optimal antiderivative

$$\frac{\ln\left(\frac{4+(x^2-x)x+e^9}{\ln\left(\frac{x}{-2+x}\right)+x}\right)x}{3}$$

command

```
integrate(((((-2+x)*exp(9)+x**4-3*x**3+2*x**2+4*x-8)*ln(x/(-2+x))+(x**2-2*x)*exp(9)+x**5-
3*x**4+2*x**3+4*x**2-8*x)*ln((exp(9)+x**3-x**2+4)/(ln(x/(-2+x))+x))+(3*x**4-8*x**3+4*x**2)*ln
2+x))+(-x**2+2*x+2)*exp(9)+2*x**5-5*x**4+4*x**3-6*x**2+8*x+8)/(((-6+3*x)*exp(9)+3*x**4-
9*x**3+6*x**2+12*x-24)*ln(x/(-2+x))+(3*x**2-6*x)*exp(9)+3*x**5-9*x**4+6*x**3+12*x**2-
24*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\left(\frac{x}{3}-\frac{1}{30}\right)\log\left(\frac{x^3-x^2+4+e^9}{x+\log\left(\frac{x}{x-2}\right)}\right)-\frac{\log\left(x+\log\left(\frac{x}{x-2}\right)\right)}{30}+\frac{\log\left(x^3-x^2+4+e^9\right)}{30}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: CoercionFailed

101.33 Problem number 5812

$$\int \frac{(-12x^7+4x^9+(12x^6-8x^8)\log(4))\log^3\left(\frac{5x-5\log(4)}{x^2}\right)+(-8x^9+8x^8\log(4))\log^4\left(\frac{5x-5\log(4)}{x^2}\right)+\log^3(x)(-32}{}$$

Optimal antiderivative

$$\left(\ln(x)+\frac{\ln\left(\frac{5}{x}-\frac{10\ln(2)}{x^2}\right)x^2}{3}\right)^4$$

command

```
integrate((((432*x**2*ln(2)-216*x**3)*ln((-10*ln(2)+5*x)/x**2)+2*(-216*x**2+324)*ln(2)+108*x*
324*x)*ln(x)**3+((432*x**4*ln(2)-216*x**5)*ln((-10*ln(2)+5*x)/x**2)**2+(2*(-216*x**4+324*x**2
324*x**3)*ln((-10*ln(2)+5*x)/x**2))*ln(x)**2+((144*x**6*ln(2)-72*x**7)*ln((-10*ln(2)+5*x)/x**
72*x**6+108*x**4)*ln(2)+36*x**7-108*x**5)*ln((-10*ln(2)+5*x)/x**2)**2)*ln(x)+(16*x**8*ln(2)-
8*x**9)*ln((-10*ln(2)+5*x)/x**2)**4+(2*(-8*x**8+12*x**6)*ln(2)+4*x**9-12*x**7)*ln((-
10*ln(2)+5*x)/x**2)**3)/(162*x*ln(2)-81*x**2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{x^8\log\left(\frac{5x-10\log(2)}{x^2}\right)^4}{81}+\frac{4x^6\log(x)\log\left(\frac{5x-10\log(2)}{x^2}\right)^3}{27}+\frac{2x^4\log(x)^2\log\left(\frac{5x-10\log(2)}{x^2}\right)^2}{3}+\frac{4x^2\log(x)^3\log\left(\frac{5x-10\log(2)}{x^2}\right)}{3}+\log(x)^4$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.34 Problem number 5926

$$\int \frac{e^{-x}\left(3e^x x^2+e^{e^{e^{\frac{1}{3}e^{\frac{2-x^2}{x}}}}}\left(3x^2+e^{e^{\frac{1}{3}e^{\frac{2-x^2}{x}}}+\frac{1}{3}e^{\frac{2-x^2}{x}}+\frac{2-x^2}{x}}\left(2+x^2\right)\right)\right)}{3x^2}\,dx$$

Optimal antiderivative

$$x-\mathrm{e}^{\mathrm{e}^{\mathrm{e}^{\frac{\mathrm{e}^{\frac{2}{x}-x}}{3}}}}\mathrm{e}^{-x}+5$$

command

```
integrate(1/3*(((x**2+2)*exp((-x**2+2)/x)*exp(1/3*exp((-x**2+2)/x))*exp(exp(1/3*exp((-
x**2+2)/x)))+3*x**2)*exp(exp(exp(1/3*exp((-x**2+2)/x))))+3*exp(x)*x**2)/exp(x)/x**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$x-e^{-x}e^{e^{e^{\frac{e^{\frac{2-x^2}{x}}}{3}}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.35 Problem number 6723

$$\int e^{-6+e^{5x}-e^{32e^{-1+e^{5x}}}x^2}\left(e^{32e^{-1+e^{5x}}}x^x\left(-2e^{1-e^{5x}}x-160e^{5x}x^2\right)+e^{1-e^{5x}}x^x(1+\log(x))\right)dx$$

Optimal antiderivative

$$e^{x\ln(x)}e^{-x^2e^{32\,e^{e^{5x}-1}}-5}$$

command

```
integrate(((-2*x*exp(-exp(5*x)+1)-160*x**2*exp(5*x))*exp(x*ln(x))*exp(16/exp(-exp(5*x)+1))**2
exp(5*x)+1)*exp(x*ln(x)))/exp(-exp(5*x)+1)/exp(x**2*exp(16/exp(-exp(5*x)+1))**2+5),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$e^{x\log(x)}e^{-x^2e^{32e^{e^{5x}-1}}-5}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.36 Problem number 6731

$$\int \frac{30x+e^{-6+2e^x}(2-64e^xx)-64\log(x)+2\log^2(x)+e^{-3+e^x}(-64+(4-64e^xx)\log(x))}{}\,dx$$

Optimal antiderivative

$$\frac{2x}{\left((\ln(x)+e^{e^x-3})^2-x\right)^{16}}$$

command

```
integrate(((-64*exp(x)*x+2)*exp(exp(x)-3)**2+((-64*exp(x)*x+4)*ln(x)-64)*exp(exp(x)-
3)+2*ln(x)**2-64*ln(x)+30*x)/(ln(x)**34+exp(exp(x)-3)**34+(561*ln(x)**2-17*x)*exp(exp(x)-
3)**32+(5984*ln(x)**3-544*x*ln(x))*exp(exp(x)-3)**31+(46376*ln(x)**4-8432*x*ln(x)**2+136*x**2
3)**30+(278256*ln(x)**5-84320*x*ln(x)**3+4080*x**2*ln(x))*exp(exp(x)-3)**29+(1344904*ln(x)**6
611320*x*ln(x)**4+59160*x**2*ln(x)**2-680*x**3)*exp(exp(x)-3)**28+(5379616*ln(x)**7-
3423392*x*ln(x)**5+552160*x**2*ln(x)**3-19040*x**3*ln(x))*exp(exp(x)-3)**27+(18156204*ln(x)**
15405264*x*ln(x)**6+3727080*x**2*ln(x)**4-257040*x**3*ln(x)**2+2380*x**4)*exp(exp(x)-
3)**26+(52451256*ln(x)**9-57219552*x*ln(x)**7+19380816*x**2*ln(x)**5-2227680*x**3*ln(x)**3+61
3)**25+(131128140*ln(x)**10-178811100*x*ln(x)**8+80753400*x**2*ln(x)**6-13923000*x**3*ln(x)**
6188*x**5)*exp(exp(x)-3)**24+(286097760*ln(x)**11-476829600*x*ln(x)**9+276868800*x**2*ln(x)**
66830400*x**3*ln(x)**5+6188000*x**4*ln(x)**3-148512*x**5*ln(x))*exp(exp(x)-3)**23+(548354040*
1096708080*x*ln(x)**10+795997800*x**2*ln(x)**8-256183200*x**3*ln(x)**6+35581000*x**4*ln(x)**4
```

```
1707888*x**5*ln(x)**2+12376*x**6)*exp(exp(x)-3)**22-x**17+(927983760*ln(x)**13-2193416160*x*l
805147200*x**3*ln(x)**7+156556400*x**4*ln(x)**5-12524512*x**5*ln(x)**3+272272*x**6*ln(x))*exp
3)**21+(1391975640*ln(x)**14-3838478280*x*ln(x)**12+4086122040*x**2*ln(x)**10-2113511400*x**3
65753688*x**5*ln(x)**4+2858856*x**6*ln(x)**2-19448*x**7)*exp(exp(x)-3)**20+(1855967520*ln(x)*
5905351200*x*ln(x)**13+7429312800*x**2*ln(x)**11-4696692000*x**3*ln(x)**9+1565564000*x**4*ln(
263014752*x**5*ln(x)**5+19059040*x**6*ln(x)**3-388960*x**7*ln(x))*exp(exp(x)-3)**19+(22039614
8014405200*x*ln(x)**14+11763078600*x**2*ln(x)**12-8923714800*x**3*ln(x)**10+3718214500*x**4*l
832880048*x**5*ln(x)**6+90530440*x**6*ln(x)**4-3695120*x**7*ln(x)**2+24310*x**8)*exp(exp(x)-
3)**18+(2333606220*ln(x)**17-9617286240*x*ln(x)**15+16287339600*x**2*ln(x)**13-14602442400*x*
2141691552*x**5*ln(x)**7+325909584*x**6*ln(x)**5-22170720*x**7*ln(x)**3+437580*x**8*ln(x))*ex
3)**17+(2203961430*ln(x)**18-10218366630*x*ln(x)**16+19777483800*x**2*ln(x)**14-20686793400*x
4551094548*x**5*ln(x)**8+923410488*x**6*ln(x)**6-94225560*x**7*ln(x)**4+3719430*x**8*ln(x)**2
24310*x**9)*exp(exp(x)-3)**16+(1855967520*ln(x)**19-9617286240*x*ln(x)**17+21095982720*x**2*l
25460668800*x**3*ln(x)**13+18388260800*x**4*ln(x)**11-8090834752*x**5*ln(x)**9+2110652544*x**
301521792*x**7*ln(x)**5+19836960*x**8*ln(x)**3-388960*x**9*ln(x))*exp(exp(x)-3)**15+(13919756
8014405200*x*ln(x)**18+19777483800*x**2*ln(x)**16-27279288000*x**3*ln(x)**14+22985326000*x**4
12136252128*x**5*ln(x)**10+3957473520*x**6*ln(x)**8-753804480*x**7*ln(x)**6+74388600*x**8*ln(
2917200*x**9*ln(x)**2+19448*x**10)*exp(exp(x)-3)**14+(927983760*ln(x)**21-5905351200*x*ln(x)*
25460668800*x**3*ln(x)**15+24753428000*x**4*ln(x)**13-15446139072*x**5*ln(x)**11+6156069920*x
1507608960*x**7*ln(x)**7+208288080*x**8*ln(x)**5-13613600*x**9*ln(x)**3+272272*x**10*ln(x))*e
3)**13+(548354040*ln(x)**22-3838478280*x*ln(x)**20+11763078600*x**2*ln(x)**18-20686793400*x**
16733317328*x**5*ln(x)**12+8002890896*x**6*ln(x)**10-2449864560*x**7*ln(x)**8+451290840*x**8*
44244200*x**9*ln(x)**4+1769768*x**10*ln(x)**2-12376*x**11)*exp(exp(x)-3)**12+(286097760*ln(x)
2193416160*x*ln(x)**21+7429312800*x**2*ln(x)**19-14602442400*x**3*ln(x)**17+18388260800*x**4*
15446139072*x**5*ln(x)**13+8730426432*x**6*ln(x)**11-3266486080*x**7*ln(x)**9+773641440*x**8*
106186080*x**9*ln(x)**5+7079072*x**10*ln(x)**3-148512*x**11*ln(x))*exp(exp(x)-3)**11+(131128
1096708080*x*ln(x)**22+4086122040*x**2*ln(x)**20-8923714800*x**3*ln(x)**18+12641929300*x**4*l
12136252128*x**5*ln(x)**14+8002890896*x**6*ln(x)**12-3593134688*x**7*ln(x)**10+1063756980*x**
194674480*x**9*ln(x)**6+19467448*x**10*ln(x)**4-816816*x**11*ln(x)**2+6188*x**12)*exp(exp(x)-
3)**10+(52451256*ln(x)**25-476829600*x*ln(x)**23+1945772400*x**2*ln(x)**21-4696692000*x**3*ln
8090834752*x**5*ln(x)**15+6156069920*x**6*ln(x)**13-3266486080*x**7*ln(x)**11+1181952200*x**8
278106400*x**9*ln(x)**7+38934896*x**10*ln(x)**5-2722720*x**11*ln(x)**3+61880*x**12*ln(x))*exp
3)**9+(18156204*ln(x)**26-178811100*x*ln(x)**24+795997800*x**2*ln(x)**22-2113511400*x**3*ln(x
4551094548*x**5*ln(x)**16+3957473520*x**6*ln(x)**14-2449864560*x**7*ln(x)**12+1063756980*x**8
312869700*x**9*ln(x)**8+58402344*x**10*ln(x)**6-6126120*x**11*ln(x)**4+278460*x**12*ln(x)**2-
2380*x**13)*exp(exp(x)-3)**8+(5379616*ln(x)**27-57219552*x*ln(x)**25+276868800*x**2*ln(x)**23
805147200*x**3*ln(x)**21+1565564000*x**4*ln(x)**19-2141691552*x**5*ln(x)**17+2110652544*x**6*
1507608960*x**7*ln(x)**13+773641440*x**8*ln(x)**11-278106400*x**9*ln(x)**9+66745536*x**10*ln(
9801792*x**11*ln(x)**5+742560*x**12*ln(x)**3-19040*x**13*ln(x))*exp(exp(x)-3)**7+(1344904*ln(
15405264*x*ln(x)**26+80753400*x**2*ln(x)**24-256183200*x**3*ln(x)**22+547947400*x**4*ln(x)**2
832880048*x**5*ln(x)**18+923410488*x**6*ln(x)**16-753804480*x**7*ln(x)**14+451290840*x**8*ln(
194674480*x**9*ln(x)**10+58402344*x**10*ln(x)**8-11435424*x**11*ln(x)**6+1299480*x**12*ln(x)*
66640*x**13*ln(x)**2+680*x**14)*exp(exp(x)-3)**6+(278256*ln(x)**29-3423392*x*ln(x)**27+193808
66830400*x**3*ln(x)**23+156556400*x**4*ln(x)**21-263014752*x**5*ln(x)**19+325909584*x**6*ln(x
301521792*x**7*ln(x)**15+208288080*x**8*ln(x)**13-106186080*x**9*ln(x)**11+38934896*x**10*ln(
9801792*x**11*ln(x)**7+1559376*x**12*ln(x)**5-133280*x**13*ln(x)**3+4080*x**14*ln(x))*exp(exp
3)**5+(46376*ln(x)**30-611320*x*ln(x)**28+3727080*x**2*ln(x)**26-13923000*x**3*ln(x)**24+3558
65753688*x**5*ln(x)**20+90530440*x**6*ln(x)**18-94225560*x**7*ln(x)**16+74388600*x**8*ln(x)**
```

```
44244200*x**9*ln(x)**12+19467448*x**10*ln(x)**10-6126120*x**11*ln(x)**8+1299480*x**12*ln(x)**
166600*x**13*ln(x)**4+10200*x**14*ln(x)**2-136*x**15)*exp(exp(x)-3)**4+(5984*ln(x)**31-
84320*x*ln(x)**29+552160*x**2*ln(x)**27-2227680*x**3*ln(x)**25+6188000*x**4*ln(x)**23-
12524512*x**5*ln(x)**21+19059040*x**6*ln(x)**19-22170720*x**7*ln(x)**17+19836960*x**8*ln(x)**
13613600*x**9*ln(x)**13+7079072*x**10*ln(x)**11-2722720*x**11*ln(x)**9+742560*x**12*ln(x)**7-
133280*x**13*ln(x)**5+13600*x**14*ln(x)**3-544*x**15*ln(x))*exp(exp(x)-3)**3+(561*ln(x)**32-
8432*x*ln(x)**30+59160*x**2*ln(x)**28-257040*x**3*ln(x)**26+773500*x**4*ln(x)**24-
1707888*x**5*ln(x)**22+2858856*x**6*ln(x)**20-3695120*x**7*ln(x)**18+3719430*x**8*ln(x)**16-
2917200*x**9*ln(x)**14+1769768*x**10*ln(x)**12-816816*x**11*ln(x)**10+278460*x**12*ln(x)**8-
66640*x**13*ln(x)**6+10200*x**14*ln(x)**4-816*x**15*ln(x)**2+17*x**16)*exp(exp(x)-
3)**2+(34*ln(x)**33-544*x*ln(x)**31+4080*x**2*ln(x)**29-19040*x**3*ln(x)**27+61880*x**4*ln(x)
148512*x**5*ln(x)**23+272272*x**6*ln(x)**21-388960*x**7*ln(x)**19+437580*x**8*ln(x)**17-
388960*x**9*ln(x)**15+272272*x**10*ln(x)**13-148512*x**11*ln(x)**11+61880*x**12*ln(x)**9-
19040*x**13*ln(x)**7+4080*x**14*ln(x)**5-544*x**15*ln(x)**3+34*x**16*ln(x))*exp(exp(x)-
3)-17*x*ln(x)**32+136*x**2*ln(x)**30-680*x**3*ln(x)**28+2380*x**4*ln(x)**26-6188*x**5*ln(x)**
19448*x**7*ln(x)**20+24310*x**8*ln(x)**18-24310*x**9*ln(x)**16+19448*x**10*ln(x)**14-
12376*x**11*ln(x)**12+6188*x**12*ln(x)**10-2380*x**13*ln(x)**8+680*x**14*ln(x)**6-
136*x**15*ln(x)**4+17*x**16*ln(x)**2+34*ln(x)*exp(exp(x)-3)**33),x)
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

101.37 Problem number 6748

$$\int \frac{e^{-\frac{e^{16}}{x}-\frac{6e^{-\frac{e^{16}}{x}}}{x}}\left(-24e^{16}x+24x^2+2e^{8+\frac{e^{16}}{x}+\frac{6e^{-\frac{e^{16}}{x}}}{x}+2x}x^2+8e^{\frac{e^{16}}{x}}x^3+e^{\frac{3e^{-\frac{e^{16}}{x}}}{x}}\left(e^{4+x}\left(-12e^{16}+12x\right)+e^{4+\frac{e^{16}}{x}+x}\right.\right.}{x^2}$$

Optimal antiderivative

$$\left(\mathrm{e}^{4+x}+2x\,\mathrm{e}^{-\frac{3\,\mathrm{e}^{-\frac{\mathrm{e}^{16}}{x}}}{x}}\right)^2$$

command

```
integrate((2*x**2*exp(4+x)**2*exp(exp(16)/x)*exp(3/x/exp(exp(16)/x))**2+((4*x**3+4*x**2)*exp(
12*exp(16)+12*x)*exp(4+x))*exp(3/x/exp(exp(16)/x))+8*x**3*exp(exp(16)/x)-24*x*exp(16)+24*x**2
```

Sympy 1.10.1 under Python 3.10.4 output

$$4x^2e^{-\frac{6e^{-\frac{e^{16}}{x}}}{x}}+4xe^{-\frac{3e^{-\frac{e^{16}}{x}}}{x}}e^{x+4}+e^{2x+8}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.38 Problem number 6870

$$\int \frac{e^2(-1-2x)+6x+14x^2+4x^3+\left(e^2-6x-2x^2\right)\log\left(\frac{-e^2+6x+2x^2}{2x}\right)+\log(x)\left(-3e^2+12x+2x^2+\left(e^2-6x-\right.\right.}{e^2-6x-2x^2}$$

Optimal antiderivative

$$x-x^2-1+\ln(x)\,x\left(\ln\left(x-\frac{\mathrm{e}^2}{2x}+3\right)-2\right)$$

command

```
integrate((((exp(2)-2*x**2-6*x)*ln(1/2*(-exp(2)+2*x**2+6*x)/x)-3*exp(2)+2*x**2+12*x)*ln(x)+(e
2*x**2-6*x)*ln(1/2*(-exp(2)+2*x**2+6*x)/x)+(-1-2*x)*exp(2)+4*x**3+14*x**2+6*x)/(exp(2)-
2*x**2-6*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-x^2-2x\log(x)+x+\left(x\log(x)+\frac{5}{48}\right)\log\left(\frac{x^2+3x-\frac{e^2}{2}}{x}\right)+\frac{5\log(x)}{48}-\frac{5\log\left(x^2+3x-\frac{e^2}{2}\right)}{48}$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: CoercionFailed

101.39 Problem number 6874

$$\int \frac{4-9x-4e^{-2+x}x+\left(-4e^{-2+x}-9x+4\log(x)\right)\log\left(\frac{1}{4}\left(4e^{-2+x}+9x-4\log(x)\right)\right)+\left(4e^{-2+x}+9x-4\log(x)\right)\log}{\left(-4e^{-2+x}x^2-9x^3+4x^2\log(x)\right)\log\left(\frac{1}{4}\left(4e^{-2+x}+9x\right.\right.}$$

Optimal antiderivative

$$\frac{\ln\left(x\ln\left(-\ln(x)+\mathrm{e}^{-2+x}+\frac{9x}{4}\right)\right)}{x}$$

command

```
integrate(((-4*ln(x)+4*exp(-2+x)+9*x)*ln(-ln(x)+exp(-2+x)+9/4*x)*ln(x*ln(-ln(x)+exp(-
2+x)+9/4*x))+(4*ln(x)-4*exp(-2+x)-9*x)*ln(-ln(x)+exp(-2+x)+9/4*x)-4*x*exp(-2+x)-9*x+4)/(4*x**
4*x**2*exp(-2+x)-9*x**3)/ln(-ln(x)+exp(-2+x)+9/4*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\log\left(x\log\left(\frac{9x}{4}+e^{x-2}-\log(x)\right)\right)}{x}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.40 Problem number 6975

$$\int \frac{x - x^2 + (1250 - 2500x + e^x(-2500x + 2500x^2))\log\left(-\frac{e^{2e^x}}{-x+x^2}\right)}{-5x + 5x^2 + e(-4x + 4x^2)}\,dx$$

Optimal antiderivative

$$\frac{625\ln\left(\frac{\mathrm{e}^{2\,\mathrm{e}^x}}{-x^2+x}\right)^2 - x}{5 + 4\,\mathrm{e}}$$

command

```
integrate((((2500*x**2-2500*x)*exp(x)-2500*x+1250)*ln(-exp(exp(x))**2/(x**2-x))-x**2+x)/((4*x
4*x)*exp(1)+5*x**2-5*x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{x}{5+4e} + \frac{625\log\left(-\frac{e^{2e^x}}{x^2-x}\right)^2}{5+4e}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.41 Problem number 7352

$$\int \frac{-16x^2 - 68x^3 - 32x^4 - 4x^5 + e^2(64x^3 + 32x^4 + 4x^5) + (4x^3 + e^2(16x^2 + 4x^3))\log(x) + (64x^3 + 32x^4 + 4x^5 +}{}$$

Optimal antiderivative

$$\frac{\left(\frac{x}{\ln\left(\frac{\left(\mathrm{e}^2+\ln\left(\frac{\ln(x)}{4+x}+x\right)\right)^2}{x^2}\right)} - x + 2\right)^2}{x^2}$$

command

```
integrate((((4*x**2+8*x-32)*ln(x)+4*x**4+24*x**3-128*x)*ln((ln(x)+x**2+4*x)/(4+x))+(4*x**2+8
32)*exp(2)*ln(x)+(4*x**4+24*x**3-128*x)*exp(2))*ln((ln((ln(x)+x**2+4*x)/(4+x))**2+2*exp(2)*ln
4*x**2-16*x)*ln(x)-4*x**4-32*x**3-64*x**2)*ln((ln(x)+x**2+4*x)/(4+x))+(-4*x**2-16*x)*exp(2)*l
4*x**4-32*x**3-64*x**2)*exp(2))*ln((ln((ln(x)+x**2+4*x)/(4+x))**2+2*exp(2)*ln((ln(x)+x**2+4*x
4*x**3-8*x**2+32*x)*ln(x)-4*x**5-24*x**4+128*x**2)*ln((ln(x)+x**2+4*x)/(4+x))+((-4*x**3-
8*x**2+32*x)*exp(2)-4*x**3+8*x**2)*ln(x)+(-4*x**5-24*x**4+128*x**2)*exp(2)+4*x**5+24*x**4+4*x
120*x**2-32*x)*ln((ln((ln(x)+x**2+4*x)/(4+x))**2+2*exp(2)*ln((ln(x)+x**2+4*x)/(4+x))+exp(2)**
4*x**5-32*x**4-68*x**3-16*x**2)/(((x**4+4*x**3)*ln(x)+x**6+8*x**5+16*x**4)*ln((ln(x)+x**2+4*x
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{x+(4-2x)\log\left(\frac{\log\left(\frac{x^2+4x+\log(x)}{x+4}\right)^2+2e^2\log\left(\frac{x^2+4x+\log(x)}{x+4}\right)+e^4}{x^2}\right)}{x\log\left(\frac{\log\left(\frac{x^2+4x+\log(x)}{x+4}\right)^2+2e^2\log\left(\frac{x^2+4x+\log(x)}{x+4}\right)+e^4}{x^2}\right)^2}+\frac{4-4x}{x^2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.42 Problem number 7827

$$\int\frac{e^2\left(-ex-x^2\right)+e^{\frac{\log(e+x)+e^2\log(5x\log(4))}{e^2}}\left(x+e^2(e+x)\right)}{e^2\left(ex+x^2\right)}\,dx$$

Optimal antiderivative

$$\mathrm{e}^{\ln(10x\ln(2))+\ln(x+\mathrm{e})\mathrm{e}^{-2}}-x$$

command

```
integrate((((x+exp(1))*exp(2)+x)*exp((exp(2)*ln(10*x*ln(2))+ln(x+exp(1)))/exp(2))+(-
x*exp(1)-x**2)*exp(2))/(x*exp(1)+x**2)/exp(2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\frac{10x(x+e)^{e^{-2}}e^2\log(2)}{1+e^2}+\frac{10x(x+e)^{e^{-2}}e^4\log(2)}{1+e^2}-xe^2-\frac{10(x+e)^{e^{-2}}e^7\log(2)}{1+e^2}-\frac{10(x+e)^{e^{-2}}e^5\log(2)}{1+e^2}+10(x+e)^{e^{-2}}e^5\log(2)}{e^2}$$

Sympy 1.8 under Python 3.8.8 output

$$\frac{\int\left(-\frac{e^3}{x+e}\right)dx+\int\left(-\frac{xe^2}{x+e}\right)dx+\int\frac{10x(x+e)^{e^{-2}}\log(2)}{x+e}\,dx+\int\frac{10(x+e)^{e^{-2}}e^3\log(2)}{x+e}\,dx+\int\frac{10x(x+e)^{e^{-2}}e^2\log(2)}{x+e}\,dx}{e^2}$$

101.43 Problem number 7854

$$\int \frac{e^{-9-\log^2\left(\frac{1}{16}\left(4x^2-\log(x)\right)\right)}\left(4x^2-\log(x)\right)^6\left(30-240x^2+\left(-10+80x^2\right)\log\left(\frac{1}{16}\left(4x^2-\log(x)\right)\right)\right)}{16777216\left(-4x^3+x\log(x)\right)}\,dx$$

Optimal antiderivative

$$5\,\mathrm{e}^{-\left(3-\ln\left(\frac{x^2}{4}+\ln\left(\frac{1}{x^{\frac{1}{16}}}\right)\right)\right)^2}$$

command

```
integrate(((80*x**2-10)*ln(1/4*x**2-1/16*ln(x))-240*x**2+30)/(x*ln(x)-4*x**3)/exp(ln(1/4*x**2
1/16*ln(x))**2-6*ln(1/4*x**2-1/16*ln(x))+9),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{\left(20480x^{12}-30720x^{10}\log\left(x\right)+19200x^8\log\left(x\right)^2-6400x^6\log\left(x\right)^3+1200x^4\log\left(x\right)^4-120x^2\log\left(x\right)^5+5\log\left(x\right)^6\right)}{16777216}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.44 Problem number 8409

$$\int \frac{-36x^2-12x^3-18x^2\log(5)+e^{80}x^{40}(492+240x+246\log(5))}{4+4x+x^2+(4+2x)\log(5)+\log^2(5)}\,dx$$

Optimal antiderivative

$$\frac{6\left(\mathrm{e}^{40\ln(x)+80}-x^2\right)x}{x+2+\ln\left(5\right)}$$

command

```
integrate(((246*ln(5)+240*x+492)*exp(40*ln(x)+80)-18*x**2*ln(5)-12*x**3-36*x**2)/(ln(5)**2+(2
```

Sympy 1.10.1 under Python 3.10.4 output

output too large to display

Sympy 1.8 under Python 3.8.8 output

Timed out

101.45 Problem number 8484

$$\int \frac{-16-27x-2x^2+\left(3x+x^2\right)\log\left(e^{4x}x^4\right)+\left(5x-2x^2+\left(-4x-x^2\right)\log\left(e^{4x}x^4\right)+\left(-5+2x+(4+x)\log\left(e^{4x}x\right.\right.\right.}{\left(5x-2x^2+\left(-4x-x^2\right)\log\left(e^{4x}x^4\right)+\left(-5+2x+(4+x)\log\left(e^{4x}x^4\right)\right)\log\left(-5+2x+(4\right.\right.}$$

Optimal antiderivative

$$\frac{x}{\ln\left(-\ln\left((4+x)\ln\left(x^4\mathrm{e}^{4x}\right)+2x-5\right)+x\right)}-5$$

command

```
integrate(((((4+x)*ln(x**4*exp(x)**4)+2*x-5)*ln((4+x)*ln(x**4*exp(x)**4)+2*x-5)+(-
x**2-4*x)*ln(x**4*exp(x)**4)-2*x**2+5*x)*ln(-ln((4+x)*ln(x**4*exp(x)**4)+2*x-5)+x)+(x**2+3*x)
2*x**2-27*x-16)/((((4+x)*ln(x**4*exp(x)**4)+2*x-5)*ln((4+x)*ln(x**4*exp(x)**4)+2*x-
5)+(-x**2-4*x)*ln(x**4*exp(x)**4)-2*x**2+5*x)/ln(-ln((4+x)*ln(x**4*exp(x)**4)+2*x-
5)+x)**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$\frac{x}{\log\left(x-\log\left(2x+(x+4)\log\left(x^4e^{4x}\right)-5\right)\right)}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.46 Problem number 8897

$$\int \frac{e^{-\frac{3025+6065x+2856x^2+58x^3-174x^4-3x^5+9x^6+x^7+\left(660+852x+144x^2-60x^3-12x^4\right)\log(4)+\left(-74-106x-24x^2+10x^3+2x^4\right)\log^2(4)+(-12-12x)\log^3(4)+(1}{3025+1760x-184x^2-238x^3-16x^4+8x^5+x^6+\left(660+192x-48x^2-12x^3\right)\log(4)+\left(-74-32x+8x^2+2x^3\right)\log^2(4)-12\log^3(4)+\log^4(4)}}}{-166375-}$$

Optimal antiderivative

$$x\,\mathrm{e}^{-\frac{5x}{\left(x+\frac{(2\ln(2)-3)^2}{(4+x)^2}-4\right)^2}-x-1}$$

command

```
integrate((64*(1-x)*ln(2)**6+32*(18*x-18)*ln(2)**5+16*(-3*x**4-9*x**3+60*x**2+9*x-
57)*ln(2)**4+8*(36*x**4+108*x**3-720*x**2-1188*x+1764)*ln(2)**3+4*(-3*x**7-21*x**6+47*x**5+23
1926*x**3-6232*x**2-863*x+3135)*ln(2)**2+2*(18*x**7+126*x**6-282*x**5-2076*x**4+9612*x**3+503
54450)*ln(2)-x**10-11*x**9+17*x**8+625*x**7+2515*x**6+3943*x**5+21533*x**4+126599*x**3+259580
166375)/(64*ln(2)**6-576*ln(2)**5+16*(3*x**3+12*x**2-48*x-57)*ln(2)**4+8*(-36*x**3-
144*x**2+576*x+1764)*ln(2)**3+4*(3*x**6+24*x**5-48*x**4-606*x**3-120*x**2+3552*x+3135)*ln(2)*
18*x**6-144*x**5+288*x**4+4284*x**3+3312*x**2-31680*x-54450)*ln(2)+x**9+12*x**8-485*x**6-
1320*x**5+5712*x**4+26099*x**3-5940*x**2-145200*x-166375)/exp((16*(1+x)*ln(2)**4+8*(-
12*x-12)*ln(2)**3+4*(2*x**4+10*x**3-24*x**2-106*x-74)*ln(2)**2+2*(-12*x**4-60*x**3+144*x**2+8
3*x**5-174*x**4+58*x**3+2856*x**2+6065*x+3025)/(16*ln(2)**4-96*ln(2)**3+4*(2*x**3+8*x**2-
32*x-74)*ln(2)**2+2*(-12*x**3-48*x**2+192*x+660)*ln(2)+x**6+8*x**5-16*x**4-238*x**3-
184*x**2+1760*x+3025)),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$xe^{-\frac{x^7+9x^6-3x^5-174x^4+58x^3+2856x^2+6065x+(-96x-96)\log(2)^3+(16x+16)\log(2)^4+\left(-24x^4-120x^3+288x^2+1704x+1320\right)\log(2)+\left(8x^4+40x^3-96x^2-424x-\right.}{x^6+8x^5-16x^4-238x^3-184x^2+1760x+\left(-24x^3-96x^2+384x+1320\right)\log(2)+\left(8x^3+32x^2-128x-296\right)\log(2)^2-96\log(2)^3+16\log(2)^4+3025}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.47 Problem number 9060

$$\int 8e^{e^{\frac{8}{5}x^5(i\pi+\log(4))}+\frac{8}{5}x^5(i\pi+\log(4))}x^4(i\pi+\log(4))\,dx$$

Optimal antiderivative

$$e^{e^{\frac{8x^5(2\ln(2)+i\pi)}{5}}}$$

command

```
integrate(8*x**4*(2*ln(2)+I*pi)*exp(8/5*x**5*(2*ln(2)+I*pi))*exp(exp(8/5*x**5*(2*ln(2)+I*pi))
```

Sympy 1.10.1 under Python 3.10.4 output

$$e^{e^{\frac{8x^5\cdot(2\log(2)+i\pi)}{5}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.48 Problem number 9595

$$\int \frac{1}{5}e^{-x}\left(e^{\frac{2e^{-x}x}{5}}\left(5e^x+2x-2x^2\right)+e^{(-4+e^5)^x}\left(-5e^x-5\left(e\left(-4+e^5\right)\right)^x x\log\left(-4+e^5\right)\right)\right)dx$$

Optimal antiderivative

$$\left(e^{\frac{2x\,e^{-x}}{5}}-e^{e^{x\ln\left(e^5-4\right)}}\right)x$$

command

```
integrate(1/5*((-5*x*exp(x)*ln(exp(5)-4)*exp(x*ln(exp(5)-4))-5*exp(x))*exp(exp(x*ln(exp(5)-
4)))+(5*exp(x)-2*x**2+2*x)*exp(1/5*x/exp(x))**2)/exp(x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$xe^{\frac{2xe^{-x}}{5}}-xe^{e^{x\log\left(-4+e^5\right)}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.49 Problem number 9704

$$\int \frac{(9+e-x^2-18x^4+8x^5-7x^8)\,(i\pi+\log(3))}{81+e^2-108x+54x^2-12x^3+109x^4-108x^5+36x^6-4x^7+54x^8-36x^9+6x^{10}+12x^{12}-4x^{13}+x^{16}+e\,(}$$

Optimal antiderivative

$$\frac{x(\ln(3)+i\pi)}{(x^4-x+3)^2+\mathrm{e}}$$

command

```
integrate((exp(1)-7*x**8+8*x**5-18*x**4-x**2+9)*(ln(3)+I*pi)/(exp(1)**2+(2*x**8-4*x**5+12*x**
12*x+18)*exp(1)+x**16-4*x**13+12*x**12+6*x**10-36*x**9+54*x**8-4*x**7+36*x**6-108*x**5+109*x*
12*x**3+54*x**2-108*x+81),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\frac{x(-\log(3)-i\pi)}{x^8-2x^5+6x^4+x^2-6x+e+9}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.50 Problem number 9924

$$\int \frac{e^{2e^{\frac{8}{-3+3\log(x)}}x^4+\frac{8}{-3+3\log(x)}}\left(8x^4-48x^4\log(x)+24x^4\log^2(x)+e^{-\frac{8}{-3+3\log(x)}}\left(3-6\log(x)+3\log^2(x)\right)\right)}{3-6\log(x)+3\log^2(x)}\,dx$$

Optimal antiderivative

$$\mathrm{e}^{2x^4\mathrm{e}^{-\frac{8}{3-3\ln(x)}}}x$$

command

```
integrate(((3*ln(x)**2-6*ln(x)+3)*exp(-4/(3*ln(x)-3))**2+24*x**4*ln(x)**2-48*x**4*ln(x)+8*x**
4/(3*ln(x)-3))**2)/(3*ln(x)**2-6*ln(x)+3)/exp(-4/(3*ln(x)-3))**2,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$xe^{2x^4e^{\frac{8}{3\log(x)-3}}}$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.51 Problem number 10025

$$\int \frac{e^x x^2 + e^5(-1-x^2) + (e^x x + e^5(1-4x+e^3x-x^2)) \log\left(\frac{-e^x x+e^5(-1+4x-e^3x+x^2)}{x}\right) \log\left(\log\left(\frac{-e^x x+e^5(-1+4x-e^3x}{x}\right.\right.}{(e^x x + e^5(1-4x+e^3x-x^2)) \log\left(\frac{-e^x x+e^5(-1+4x-e^3x+x^2)}{x}\right)}$$

Optimal antiderivative

$$x \ln\left(\ln\left(\mathrm{e}^5\left(x+4-\mathrm{e}^3-\frac{1}{x}\right)-\mathrm{e}^x\right)\right)$$

command

```
integrate(((exp(x)*x+(x*exp(3)-x**2-4*x+1)*exp(5))*ln((-exp(x)*x+(-x*exp(3)+x**2+4*x-
1)*exp(5))/x)*ln(ln((-exp(x)*x+(-x*exp(3)+x**2+4*x-1)*exp(5))/x))+exp(x)*x**2+(-x**2-
1)*exp(5))/(exp(x)*x+(x*exp(3)-x**2-4*x+1)*exp(5))/ln((-exp(x)*x+(-x*exp(3)+x**2+4*x-
1)*exp(5))/x),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$x \log\left(\log\left(\frac{-xe^x + (x^2 - xe^3 + 4x - 1)\, e^5}{x}\right)\right)$$

Sympy 1.8 under Python 3.8.8 output

Exception raised: CoercionFailed

101.52 Problem number 10117

$$\int \frac{12x - 24x^2 + 8x^3 + 3x^4 + e^6(7 - 12x + 3x^2 + 2x^3) + (26x - 22x^2 - 6x^3 + e^6(14 - 10x - 4x^2)}{-2 + 4x + 4x^2 - 12x^3 + 5x^4 + x^5 + e^6(7x - 13x^2 + 5x^3 + x^4) + (-4 + 4x + 13x^2 - 12x^3 - 2x^4 + e^6(14x - 12}$$

Optimal antiderivative

$$\ln\left(x\left((\mathrm{e}^6 + x)(7 + x) + \frac{x}{x - \ln(3) - 1}\right) - 2\right)$$

command

```
integrate((((7+2*x)*exp(3)**2+3*x**2+14*x)*ln(3)**2+((-4*x**2-10*x+14)*exp(3)**2-6*x**3-
22*x**2+26*x)*ln(3)+(2*x**3+3*x**2-12*x+7)*exp(3)**2+3*x**4+8*x**3-24*x**2+12*x)/(((x**2+7*x)
2)*ln(3)**2+((-2*x**3-12*x**2+14*x)*exp(3)**2-2*x**4-12*x**3+13*x**2+4*x-4)*ln(3)+(x**4+5*x**
13*x**2+7*x)*exp(3)**2+x**5+5*x**4-12*x**3+4*x**2+4*x-2),x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$-\log(x - \log(3) - 1)$$
$$+\log\left(x^4 + x^3(-\log(3) + 6 + e^6) + x^2(-e^6\log(3) - 7\log(3) - 6 + 6e^6) + x(-7e^6\log(3) - 7e^6 - 2) + 2 + 2\log(3\right.$$

Sympy 1.8 under Python 3.8.8 output

Timed out

101.53 Problem number 10291

$$\int \frac{e^{-2+e^{x+x^2}-6x+x^2}\left(1-6x+2x^2+e^{x+x^2}\left(x+2x^2\right)+\left(-6x+2x^2+e^{x+x^2}\left(x+2x^2\right)\right)\log(x)\right)}{x}\,dx$$

Optimal antiderivative

$$\mathrm{e}^{x(-6+x)-2+\mathrm{e}^{x^2+x}}(1+\ln(x))$$

command

```
integrate(((((2*x**2+x)*exp(x**2+x)+2*x**2-6*x)*ln(x)+(2*x**2+x)*exp(x**2+x)+2*x**2-
6*x+1)*exp(exp(x**2+x)+x**2-6*x-2)/x,x)
```

Sympy 1.10.1 under Python 3.10.4 output

$$(\log(x)+1)\,e^{x^2-6x+e^{x^2+x}-2}$$

Sympy 1.8 under Python 3.8.8 output

Timed out