

MAE-186
FORTRAN Examination
Spring 2006

Problem 1

Write a FORTRAN program to create the following two-dimensional array: The first row is composed of 59,049 columns. The entries in the first row go from 1 to 7 repeatedly. Namely,

1 2 3 4 5 6 7 1 2 3 4 5 6 7 1 2 3 4 5 6 7 ... 1 2 3 4 5 6 7

The second row is composed of 19683 columns. The first entry in the second row is equal to the sum of the first 3 columns of the first row. The second entry in the second row is equal to the sum of the next 3 columns of the first row. Namely, the second row is:

6 15 10 12 ... 9 18

The third row is composed of 6561 columns. The first entry on the third row is equal to the sum of the first 3 columns of the second row. The second entry in the third row is equal to the sum of the next 3 columns of the second row.

The fourth row is composed of 2187 columns. In the same fashion of rows 2 and 3.

The fifth row is composed of 729 columns. In the same fashion of rows 2, 3 and 4.

Continue computing until row number 10. Note: $3^{10} = 59,049$). The program should only print elements in the tenth row. (15 pts)

Problem 2

Write a function program to evaluate the following series. Terminating the sum when the value of a term is less than 10^{-8} (10 points)

$$f(x) = 1 - \frac{1}{3}x + \frac{14}{36}x^2 - \frac{147}{369}x^3 + \dots$$

Problem 3

Write a program subroutine MULT(M,N,NUMBER) that returns the number of multiples of N that are found between 1 and M. This value is returned in the variable NUMBER. (10 points)

For example, a CALL MULT(99,10,NUMBER) would return NUMBER equal to 9 (since there are 9 multiples of 10 between 0 and 99).

Problem 4

Write a subroutine whose input is an integer N . As output it returns a vector of size N with the first N elements of the Fibonacci sequence. (10 pts)

Problem 5

State if each of the following statements is true or false. You will get 2 pts for each correct answer. HOWEVER, if your answer is incorrect you will get -1 pts. Of course, you have the option not to answer any of the extra credit questions. In that case, there will not be any positive or negative credit.

1. PARAMETER (PI = ACOS(-1.)) will not produce any compilation errors.
2. in FORTRAN it is perfectly valid to GO TO a CONTINUE statement.
3. in FORTRAN, FUNCTION subprograms and the main program may use the same identifier.

"I crave mental exaltation."

Sherlock Holmes, The sign of the four