

The result of integration is:

$$\delta = \frac{N}{A_0 E} \frac{L}{c-1} \left[\ln \left[1 + (c-1) \frac{x}{L} \right] \right]_0^L$$

Which, when compared with the solution that is posted, it shows that the posted solution has the natural logarithmic symbol (ln) missing. After you plug in the limits and do proper cancellations you get:

$$\delta = \frac{N}{A_0 E} \frac{L \ln c}{c-1}$$