827.

Problem 54.28 (RHK)

We have to show that the law of radioactive decay $N = N_0 \exp(-\lambda t)$ *can be written in the form*

$$N = N_0 \left(\tfrac{1}{2}\right)^{t/t_{1/2}}.$$

Solution:

The law of radioactive decay is

$$N = N_0 \exp(-\lambda t).$$

The definition of half life $t_{1/2}$ is

$$\frac{N}{N_0} = \frac{1}{2} = e^{-\lambda t_{1/2}}.$$

From this equation we note that

$$e^{-\lambda} = \left(\frac{1}{2}\right)^{1/t_{1/2}}.$$

Using the above result, we can write the law of radioactive decay in the form

$$N = N_0 \left(\tfrac{1}{2}\right)^{t/t_{1/2}}.$$