Consider a sample of radioactive nuclei at time . Also consider that is the number of particles that decay in some time interval . From discrete decay model we can write

$$\frac{\Delta N(t)}{\Delta t} = -\lambda N(t) \tag{1}$$

From continuous decay model (for $N \to \infty$ and $t \to 0$)

$$\frac{dN(t)}{dt} = -\lambda N(t) \tag{2}$$

(a) Plot the logarithm of the number of radioactive particle left $[\ln N(t)]$ versus time and logarithm of the decay rate $[\ln(\Delta N(t))]$ versus time. You will obtain exponential decay when you start with large values of and a stochastic process for small N(0).

(b) Create two plots, one showing that the slopes of plots of N(t) versus t are independent of N(0) and the another showing that the slope is proportional to λ.