

HW #1

Due: 04/07/16

$$1. N(t) = N_0 e^{rt} \rightarrow \frac{\ln[N(t)/N_0]}{r} = t$$

$$\begin{aligned} \ln N(t) &= \ln N_0 + \ln e^{rt} \\ \ln N(t) &= \ln N_0 + rt \\ \ln N(t) - \ln(N_0) &= rt \\ \frac{\ln[N(t)/N_0]}{r} &= \frac{rt}{r} \end{aligned} \rightarrow \frac{\ln[N(t)/N_0]}{r} = t$$

$N_0 = 10$ lice

$N_t = 100 \mid 1,000 \mid 100,000,000 \mid 100,000,000,000$

$r = 0.1$ per day

a. $N_t = 100$

$$\frac{\ln[100/10]}{0.1} = t \Rightarrow \frac{\ln 10}{0.1} = t = 23.03 \text{ days}$$

b. $N_t = 1,000$

$$\frac{\ln[1000/10]}{0.1} = t \Rightarrow \frac{\ln 100}{0.1} = t = 46.05 \text{ days}$$

c. $N_t = 100,000,000$

$$\frac{\ln[100,000,000/10]}{0.1} = t \Rightarrow \frac{\ln 10,000,000}{0.1} = t = 161.18 \text{ days}$$

d. $N_t = 100,000,000,000$

$$\frac{\ln[100,000,000,000/10]}{0.1} = t \Rightarrow \frac{\ln(10,000,000,000)}{0.1} = t = 230.26 \text{ days}$$