BI 471 HW -

1) $N_t = 100$: $\frac{\ln(100/10)}{0.1} = 23.03$ days

$N_t = 1000$: $\frac{\ln(1000/10)}{0.1} = 46.05$ days

$N_t = 100{,}000{,}000$: $\frac{\ln(100{,}000{,}000/10)}{0.1} = 161.18$ days

$N_t = 100{,}000{,}000{,}000$: $\frac{\ln(100{,}000{,}000{,}000/10)}{0.1} = 230.26$ days

Does this suprise me?

No, this isn't suprising as I know that this is an exponential equation which indicates rapid growth is very possible (and likely).

2) $N_0 = 6.9 \times 10^9$ (2009)

$N_t = N_0 e^{rt} \rightarrow N_t/N_0 = e^{rt} \rightarrow \ln\left(\frac{N_t}{N_0}\right) = rt$

$\hookrightarrow \frac{\ln(N_t/N_0)}{t} = r$

$N_{50} = 6.9 \times 10^9 \times 2 = 1.38 \times 10^{10}$

$\frac{\ln\left(\frac{1.38\times10^{10}}{6.9\times10^9}\right)}{t} = \frac{\ln(2)}{50} = r = 0.014$ individuals/individual×yr

2050 ⇒ $N_{41} = (6.9 \times 10^9) e^{0.014 \cdot 41} = 1.22 \times 10^{10}$ people

3) $\frac{\ln(2)}{0.12} = t = 5.78$ years

4) A quick google search shows that the top 3 reasons for death in Oregon are cancer, heart disease, and chronic lower respiratory disease. As these issues make up a majority of deaths for people it can be seen that human death rate is density-independent because these causes of death have nothing to do with human density. Reasons that do rely on human density are problems such as automobile accidents, pollution related deaths (i.e. tuberculosis), and infectious diseases (especially before modern medicine).