Chapter 10 Test

1)

a) $y_0 = 800{,}000$

b) The population for each subsequent year was 1.045 times that of the previous year's population. 1.045 = 104.5% = 100% + 4.5%. Thus the population was growing 4.5% each year.

c) $y(30) = 800{,}000(1.045)^{30} \approx 2{,}996{,}255$

d) $2{,}000{,}000 = 800{,}000(1.045)^t$

$2.5 = (1.045)^t$

By graphing we obtain $t \approx 20.8$ yrs

3) Use the Rule of 72: $\frac{72}{4} = 18$

The population will double in approximately 18 min.

5) Since the number of cases is declining by 13% each year, 100% – 13% = 87% of the cases occur in the next year. We can model the number of cases of this disease vs. time via the equation $y = 8600(0.87)^t$.

$y(5) = 8600(0.87)^5 \approx 4286$ cases

7)

a) $\log(10) = \log(10^1) = 1$

b) $\log(1) = \log(10^0) = 0$

c) $\log(10^{-3}) = -3$

d) $\log(\frac{1}{100}) = \log(0.01) = \log(10^{-2}) = -2$

9) $10^{5x} = 10{,}000$

$\log(10^{5x}) = \log(10{,}000)$

$\log(10^{5x}) = \log(10^4)$ 🡐Rewrite 10,000 as a power of 10

$5x = 4$ 🡐Common logarithm undoes raising 10 to a power

$x = \frac{4}{5}$

11) $7.6 - 2.6 = 5$

An earthquake with a Richter magnitude of 7.6 is $10^5 = 100{,}000$ times stronger than one with a Richter magnitude of 2.6.