Name: SOLUTIONS

Section 1.5 - In class example

Math 151 – Spring 2018

1. Each of the following funtions gives the amount of substance present at time t. Give the amount initially present (at $t = 0$), state whether the function represents exponetial growth or decay, and give the percentage growth or decay rate. (assume t is in years)

   (a) $A(t) = 100(1.07)^t$

   Initial amount = 100

   $a = 1.07 > 1$ so we have exponential growth

   $1.07 = 1 + 0.07 \Rightarrow$ a 7% growth rate annually

   (b) $A(t) = 12(0.88)^t$.

   Initial amount is 12

   $a = 0.88 < 1 \Rightarrow$ exponential decay

   at a rate of 12% annually

2. Worldwide, wind energy generating capacity measured in thousands of megawatts, W was 40 in 2003 and 320 megawatts in 2006.

   (a) Use the values given to write, W, in megawatts, as a linear function of t, the number of years since 2003.

   t is time since 2003 so we have 2 points $(0, 40)$ and $(3, 320)$

   the slope of the line $m = \frac{\text{change in } W}{\text{change in time}} = \frac{320 - 40}{3} = \frac{280}{3}$

   So $\boxed{W = \frac{280}{3}t + 40}$

   (b) Use the values given to write W as an exponential function of t, the number of years since 2003. Give the annual percentage growth rate.

   We want $W = W_0 a^t$, here W_0 is the initial amount = 40W

   we need to find a, indeed

   $320 = 40a^3$ (the energy capacity in 2006 ($t=3$) is 320)

   (divide by 40 on both sides) $\frac{320}{40} = a^3 \Rightarrow 8 = a^3 \Rightarrow a = 2$.

   we have $W = 40(2)^t$ so the annual percentage growth rate is 100%.