PRE–AP ALGEBRA 2

1) Find the exponential equation which passes through the two points (0,4.0000) and (4,8.2944).

$y = a \cdot b^x$ $(0,4) \rightarrow 4 = a \cdot b^0 = a$, $y = 4 \cdot b^x$

$(4, 8.2944) \rightarrow 8.2944 = 4 \cdot b^4$,

$2.0736 = b^4$, $b = \sqrt[4]{2.0736} = 1.2$

$y = 4 \cdot (1.2)^x$

2) Find the exponential equation which passes through the two points (3,70.4) and (6,4505.6).

$y = a \cdot b^x$

$(6, 4505.6) \rightarrow 4505.6 = a \cdot b^6$

$(3, 70.4) \rightarrow 70.4 = a \cdot b^3$

$(\div) \rightarrow 64 = b^3$, $b = \sqrt[3]{64} = 4$

$70.4 = a \cdot 4^3$, $a = 1.1$

$y = 1.1 (4)^x$

3) Verify your result from problem **2** by using exponential regression.

$y = 1.1 (4)^x$

Note that $r^2 = 1$

(perfect correlation)

1A.6 CLASSWORK

4) In 2000, the population of the United States was 282.2 million people. In 2020, it was 329.5 million.

a) Estimate the population of the United States in the year 2060.

b) In the equation $p = a \cdot b^t$, what is the meaning of b?

$t = 0 \rightarrow 2000$ $p = 282.2 \cdot b^t$

$t = 20 \rightarrow 2020$

$t = 60 \rightarrow 2060$ $329.5 = 282.2 \cdot b^{20}$

$b^{20} = \frac{329.5}{282.2}$ $b = \sqrt[20]{\frac{329.5}{282.2}} = 1.007\,778\,109$

a) $p = 282.2 \cdot b^{60} = 449.2$ million

b) Each year the population of the United States increases by 0.7778%

5) Half of a sample of radioactive Uranium–235 will decay in 0.7 billion years. The initial size of the sample of Uranium–235 is 100 grams.

a) How much of the original sample will have decayed after 2.0 billion years?

b) In the equation $g = a \cdot b^t$, what is the meaning of b?

Note: let t be time in billions of years.

$g = a \cdot b^t$ $g = 100 \cdot b^t$

$50 = 100 \cdot b^{0.7}$, $0.5 = b^{0.7}$

$b = \sqrt[0.7]{0.5} = 0.371\,498\,5723$

a) $g = 100 \cdot b^2 = 13.801$

$100 - 13.801 = 86.199$ grams have decayed

b) $1 - b = 62.85\%$

Every 1.0 billion years, 62.85% of the sample will decay