STATION #1

6.1 – EXPONENTIAL GROWTH AND DECAY

1) Find the multiplier for each rate of exponential growth or decay.

a) 5.2% growth (1.052) b) 5.2% decay (.948)

c) 30% growth (1.3) d) 30% decay (.7)

2) Evaluate each expression.

a) 2^{3x} for x = -1 b) $20 \bullet 2^{2x}$ for x = 2

$\frac{1}{8}$ 320

3) The population of a city in 1990 was 1,215,112. The population was growing at a rate of about 5% per decade. Predict the population of the city in year 2010.

$1,215,112(1.05)^2 = 1,339,660$

≈1,339,661

4) The initial population of bacteria in a lab test is 400. The number of bacteria doubles every 30 minutes. Predict the bacteria population at the end of two hours.

$400(2)^4 =$ 6,400

STATION #2

6.2 – EXPONENTIAL FUNCTIONS

1) Identify each function as linear, quadratic, or exponential.

a) $g(x) = 5x - 4^2$ L b) $w(x) = x^2 + 11$ Q

c) $f(x) = 2^x + 11$ E d) $h(x) = x(x-3)$ Q

e) $b(x) = x(x-4) + (4 - x^2)$ Q f) $a(x) = \left(\frac{2}{3}\right)^{3x}$ E

2) Tell whether each function represents exponential growth or decay.

a) $f(x) = 13(0.7)^x$ decay b) $g(x) = 150(1.25)^x$ growth

c) $h(x) = 0.72 \bullet 2^x$ growth d) $k(x) = 22(0.20)^x$ decay

3) Determine the percent of growth or decay.

a) $f(x) = 13(0.7)^x$ 30% d b) $g(x) = 150(1.25)^x$ 25% growth

c) $h(x) = 0.72 \bullet 2^x$ 100% g d) $k(x) = 22(0.20)^x$ 80% decay

4) Find the final amount for each investment.

a) \$1000 earning 6.5% interest compounded quarterly for 4 years. $1000\left(1 + \frac{.065}{4}\right)^{4(4)} = \$1,294.22$

b) \$2000 earning 5.5% interest compounded daily for 3 years. $2000\left(1 + \frac{.055}{365}\right)^{365(3)} = \$2358.76$

STATION #3

6.3 – Logarithmic Functions

1) Write each equation in logarithmic form.

a) $19^2 = 361$ $\log_{19} 361 = 2$

b) $3375^{\frac{1}{3}} = 15$ $\log_{3375} 15 = \frac{1}{3}$

c) $11^{-3} = \frac{1}{1331}$ $\log_{11} \frac{1}{1331} = -3$

2) Write each equation in exponential form.

a) $\log_{12} 144 = 2$ $12^2 = 144$

b) $\log_{3600} 60 = \frac{1}{2}$ $3600^{\frac{1}{2}} = 60$

c) $\log_{11} \frac{1}{14,641} = -4$ $11^{-4} = \frac{1}{14,641}$

3) Solve each equation for x. Round your answers to the nearest hundredth.

a) $10^x = 35$ $\log 35 = x$ $x = 1.54$

b) $10^x = 0.08$ $\log .08 = x$ $x = -1.10$

4) Find the value of v in each equation.

a) $v = \log_{15} 225$ $\frac{\log 225}{\log 15} = 2 = v$

b) $8 = \log_2 v$ $2^8 = v$ $v = 256$

c) $\log_v 729 = 6$ $\sqrt[6]{v^6} = \sqrt[6]{729}$ $v = 3$

STATION #4

6.4 – Properties of Logarithmic Functions

1) Write each expression as a sum or a difference of logarithms.

a) $\log_{12}(25 \bullet 2)$ $\log_{12} 25 + \log_{12} 2$

b) $\log_5 \frac{72}{25}$ $\log_5 72 - \log_5 25$

c) $\log_3 15q$ $\log_3 15 + \log_3 q$

2) Write each expression as a single logarithm.

a) $\log_3 5 + \log_3 6$ $\log_3 30$

b) $\log_5 x - \log_5 2$ $\log_5 \frac{x}{2}$

c) $\log_8 2 + \log_8 32$ $\log_8 64$

d) $\log_9 5 + \log_9 y - \log_9 4$ $\log_9 \frac{5y}{4}$

e) $2\log_{12} 6 + \log_{12} 4$ $\log_{12}(6^2 \cdot 4) = \log_{12} 144$

3) Evaluate each expression.

a) $5^{\log_5 12}$ 12

b) $\log_2 2^{4.7}$ 4.7

c) $9^{\log_9 15} - \log_3 3^5$ $15 - 5 = 10$

4) Solve for x and check your answers.

a) $\log_2(10x) = \log_2(3x + 14)$ $10x = 3x + 14$, $7x = 14$, $\boxed{x = 2}$

b) $2\log_3 x = \log_3 4$

$x^2 = 4$

$x = \pm 2$ $\boxed{x = 2}$ * -2 does not

STATION #5

6.5 – Applications of Common Logarithms

1) Solve each equation. Round your answer to the nearest hundredth.

a) $5^x = 16$ $\quad \log_5 16 = x$ $\quad x \approx 1.72$

b) $72^{2x} = 35$ $\quad \log_{72} 35 = 2x$ $\quad 2x \approx .83$ $\quad x \approx .42$

c) $3^{-x} = 0.2$ $\quad \log_3 0.2 = -x$ $\quad -x \approx -1.46$ $\quad x \approx 1.46$

2) Evaluate each logarithmic expression to the nearest hundredth.

a) $\log_7 30.6 \approx 1.76$

b) $\log_5 10 \approx 1.43$

c) $\log_{\frac{1}{4}} 9 + 5 \approx 3.42$

$-1.584 + 5$

STATION #6

6.5 – More Applications of Common Logarithms

1) The pH of a sample of sea water is ~~8.3~~ 7.3. What is the level of [H+] (hydrogen ion in moles/liter)?

Given: $pH = -\log_{10}[H+]$

$7.3 = -\log_{10}[H^+]$

$-7.3 = \log_{10}[H^+]$

$10^{-7.3} = [H^+]$

$[H^+] = 5.01 \times 10^{-8}$

2) The intensity of a whisper is about 300 times as loud as the threshold of hearing, I_0.

Find the relative intensity, R, of this whisper in decibels.

Given:

$R = 10 \log \frac{I}{I_0}$

$R = 10 \log \frac{300 I_0}{I_0}$

$R = 10 \log 300$

$R = 24.77$ db