Graded Homework 11 – Exponents and Logarithms

1. Consider the statement $y = f(x) = \left(1 + \frac{1}{x}\right)^x$. Find: (use functional notation and a calculator)

   a. f(1)
   b. f(2)
   c. f(3)
   d. f(10)
   e. f(100)
   f. f(1000)

2. Simplify: (see page 393, properties of exponents; page 394, additional properties of exponents; and page 395, exponents in numerator and denominator)

   a. $2^2 \cdot 2^5$
   b. $a^{1-x} \cdot a^{x-1}$
   c. $\frac{e^{2x}}{e^x}$
   d. $5^{-y} \cdot 5^{3y}$

(see section 12.5)

3. If $A = p(1 + \frac{r}{100})^n$ represents the amount p dollars will grow to at interest rate r, for n years, find
   a. A, if p = $1000, r = 10%, and n = 8.
   b. A, if p = $1000, r = 100%, and n = 3.
   c. P, if A = $1000, r = 5% and n = 12.

4. If $f(x) = C e^{r x/100}$ gives a value for exponential growth, with C being the present amount today, r is the rate of increase and x is number of years, then in 1997, the population of Arizona was 4.56 million and was growing at the rate of 3.1%.
   a. Write an equation that models Arizona's growth.
   b. Use this equation to find the projected population of Arizona in 2005.

5. a. A student evaluates $f(x) = 4(2)^3$ and obtains 512. Did the student evaluate the function correctly? If not, what was the student's error?

   b. For a 10-day period, Andrew's grandfather gave him $5 each day. If Andrew saved every dollar, how much did he have at the end of the 10-day period?

   c. For a 10-day period, Andrew's grandfather gave him $5 of the first day, $10 on the second day $20 on the third day and this doubling each day continued for the remainder of the week. If Andrew saved every dollar, how much did he have at the end of the 10-day period?

6. Solve for x if $a^x = b$ means $x = \log_a b$. (see page 832 and 833, example 1 and example 2)

   a. $5^x = 25$
   b. $\log_5 25 = x$
   c. $\log_2 x = 3$
   d. $\log_6 36 = x$

e. $\log_x 9 = 2$

f. $\log_{10} 1\,000\,000 = x$

7. Use a calculator to find: (use log button and ln button on the calculator)

a. log 14

b. log 25

c. log 3249

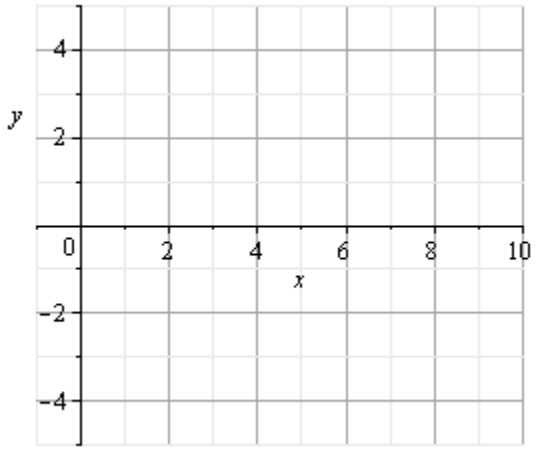
d. log 1/10

e. ln 6

f. ln 1

g. ln e

8. Graph $y = \log_2 x$ (the same equation in a different form is $2^y = x$. (see page 835, example 6)



9. Some of the largest storms on Earth are hurricanes, which have diameters that can exceed 300 miles. The barometric air pressure, P, in inches of mercury at a distance of d miles from the eye of a severe storm can be modeled by the formula $P(d) = 0.48 \ln(d + 1) + 27$. For reference purposes, average air pressure is about 30 inches of mercury. Evaluate: (use ln button on the calculator)

a. P(1)

b. P(50)

c. Is the eye of the hurricane a high or low pressure area?

10. a. The $\log_8 90$ has a value between what two whole numbers? (see page 851, example 8)

b. Find accurately to four decimal places, using your calculator the value of this logarithm.