Pre Calculus **Name _____**

Chapter 5 Worksheet #2

In Problems 1 - 10, solve each equation algebraically. Express solutions as a decimal rounded to 3 decimal places. Verify your results using a graphing utility.

1. $4^{1-2x} = 2$

2. $4^{x-x^2} = \frac{1}{2}$

3. $\log_{\sqrt{2}} x = -6$

4. $5^{x+2} = 7^{x-2}$

5. $9^{2x} = 27^{3x-4}$

6. $2^{x+1} \cdot 8^{-x} = 4$

7. $\log(7x-12) = 2\log x$

8. $\log_2 x + \log_2(x+2) = 3$

9. $e^{1-2x} = 4$

10. $4^{2x} - 14 = 5 \bullet 4^x$

In Problems 11 and 12, use the following result: If x is the atmospheric pressure (measured in millimeters of mercury, then the formula for the altitude h(x) (measured in meters above sea level) is $h(x) = (30T + 8000)\log\left(\frac{P_o}{x}\right)$

where T is the temperature (in degrees Celsius) and P_o is the atmospheric pressure at sea level, which is approximately 760 millimeters of mercury.

11. At what height is a Piper Cub whose instruments record an outside temperature of 0^o C and a barometric pressure of 300 millimeters of mercury?

12. How high is a mountain if instruments place on its peak record a temperature of 5^o C and a barometric pressure of 500 millimeters of mercury?

13. A child's grandparents wish to purchase a bond that matures in 18 years to be used for her college education. The bond pays 4% interest compounded semiannually. How much should they pay so that the bond will be worth $85,000 at maturity?

14. The half-life of radioactive cobalt is 5.27 years. If 100 grams of radioactive cobalt is present now, how much will be present in 20 years? In 40 years?

15. Suppose the population of a newly discovered insect grows according to the logistic growth model $P(t) = \frac{50000}{1+25e^{-0.04t}}$ where P represents the population and t represents the time in years.

(a) How many insects were originally discovered?

(b) Determine the maximum population of the insect population.

(c) Use a graphing utility, graph $P = P(t)$.

(d) When will the population reach 20,000 insects?

16. The following data represent the value of an IRA invested in a variety of mutual funds.

Year	**Account Value**
0	$3000
1	$3165
2	$3299
3	$3563
4	$3926
5	$4170

(a) Using a graphing utility, draw a scatter diagram for the data.

(b) Using a graphing utility, build an exponential model from the data.

(c) Based on the model, predict the value of the account after 10 years.