Math 251 Lab #1b; "Review" of Alg., Exponentials, Logarithms, & Functions; Names(s)________________

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In this lab you will do several problems that will help your "remember" some your algebra skills. Completeness, neatness as well as accuracy are weighed when calculating your grade. You are encouraged to work in pairs or groups of 3 or 4. If you do work with more than one person, only hand-in one lab write-up per group with all names neatly written on the lab. Each person will receive the same grade in the group. To reward you for your group-work efforts you will each get 10% bonus added back to your score. This lab is due the next class meeting. We will have about a half hour that you can get together in your groups to compare answers and turn in your neatest selection. Write ONLY YOUR ANSWERS HERE, show additional work on a separate paper and staple it to this sheet. Late work turned in after Friday will be reduced by 50%. This lab is worth 65 points

1. Rancher Ray is going to build two adjacent rectangular corrals with a single line of fencing separating the two corrals. He has 360 feet of fence and he wants to use all of it. (12 pts)

   a) Draw a picture of the corrals and label the lengths of the sides with x's and y's.

   b) Write an expression for the perimeter using the fact that he is going to use all 360 feet of fencing in terms of x and y.

   c) Write an expression for total area of the two corrals in terms of x and y.

   d) Write the area of the corrals as a function of x, A(x) = ? (Hint→ Solve the expression in part b) for y, and then substitute that expression into the expression in part c).

   e) Use your result in part d) to find the dimensions of the corrals that will yield the maximum area. What is the maximum area?

2. (10 pts) For $f(x) = x^2 - 5x + 1$ evaluate and simplify:

   a) $\dfrac{f(x + h) - f(x)}{h} =$

   b) $\dfrac{f(3 + h) - f(3)}{h} =$

3. (12 pts) Find the equation of the following lines.

   a) The line has a slope of 2/3 and travels through the point (-3, 5)

   b) The line travels through the points (-2, 1) and (2, 6)

   c) The line travels through (2, 3) and is perpendicular to the line in part b).

4. (6 pts) Find the intersection of the lines given in parts 3a) and 3b) as an ordered pair.

5. The population of a certain bug "t" years after it was introduced into a new habitat is given by

$$p(t) = \frac{1200}{1 + 3e^{-t/5}}$$

(9 points, use appropriate units of measure for the following)

a) Find and *interpret* p(3)=

b) How many bugs were originally introduced, when t=0?

c) What was the population 10 years after they were introduced?

d) How long will it take before the population doubles from the starting population? (show work)

6. The population of Roseburg was 15,000 in 1975. By the year 2000, the population had grown to 20,000. Find the values of P and k so that you can use the following exponential model $R(t) = Pe^{kt}$ to answer the following questions. Let t=0 correspond to 1975. Round the value of k to 4 decimal places. (8 points)

a) What is the exponential model that represents the growth of Roseburg in the time period given? (show work)

b) According to your model, what will be the population of Roseburg in 2006?

c) How long will it take Roseburg's population to double? (show work on your extra paper)

7. (8 pts) Let $f(x) = \log_3(x - 2)$ (that's "log *base* 3")

a) What is the domain of f(x)?

b) Evaluate: f(2) = f(3) = f(5) =

c) Find the x-intercept as an ordered pair. (Hint, the y-coordinate of the x-intercept is 0, so solve f(x) = 0)