Review for Exam 1

1. Let $C(x) = 2x + 21$ be the cost to produce x batches of widgets and let $R(x) = -x^2 + 12x$ be the revenue in thousands of dollars.

(A) Draw the graphs on the same axes.

(B) Find the maximum revenue

(C) Find the minimum break-even quantity.

(D) Find the profit from selling 6 batches of widgets.

2. The revenue in thousands of dollars from producing x units of an item is

$$R(x) = 10x - 0.05x^2.$$

(A) Find the average rate of change of revenue when production is increased from 101 to 102 units.

(B) Use the definition of the derivative as the limit of the difference quotient as $h \to 0$ to find the marginal revenue at $x = 101$. Interpret the result.

(C) Find the additional revenue if production is increased from 101 to 102 units.

3. Given the function

$$g(x) = \frac{2x^2 - 4}{x^2 - 9}$$

(A) Find any asymptotes of $g(x)$.

(B) Graph the function $g(x)$. Include any asymptotes.

4. Eva wants to invest $8000 in a fund. Fund A offers 5.3% compounded monthly. Fund B offers 5.0% compounded continuosly.

(A) How much money will be in the fund after 10 years if she chooses fund A

(B) How much money will be in the fund after 10 years if she chooses fund B

(C) Calculate the effective rate in each case.

5. (A) If \$2000 is deposited in an account and the amount of money after 7 years is \$2700 compounded continuously. What is the interest rate?

(B) Luis wants to have \$30,000 in 5 years for a down payment on a new house. How much should he deposit today at 4% compounded quartely, to have that amount in 5 years?

6. Consider the function

$$f(x) = \begin{cases} x^2 - 2 & \text{if } x \leq 5; \\ 2x + 3 & \text{if } x > 5. \end{cases}$$

Determine if the limit $\lim_{x \to 5} f(x)$ exists

7. Find the limits if the limits exists:

(A) $\lim_{x \to 4} \dfrac{\sqrt{x} - 2}{x^2 - x - 12}$

(B) $\lim_{x \to -3} \dfrac{1}{x + 3}$

(C) $\lim_{x \to 7} \dfrac{3x(x - 7)}{x^2 - 49}$

8. Joanne sells silk-screened T-shirts at community festivals and crafts fairs. Her marginal cost to produce one T-shirt is 3.50. Her total cost to produce 60 T-shirts is $300, and she sells them for 9 each.

(A) Find the linear cost function for Joanne's T-shirt production.

(B) How many T-shirts must she produce and sell in order to break even?

(C) How many T-shirts must she produce and sell to make a profit of $500?

9. Solve the equations

(A) $\log(x-3)+\log(x+3)=2$

(B) $2^{x+1}=3^{2x-3}$

10. Suppose the demand function for sugar is a linear function, $p = D(q)$, where p is the price in dollars and q is the quantity in thousands of pounds. When the price is \$1.2 per pounds the quantity demanded is 1 thousand pound and when the price is \$2.2 per pounds the quantity demanded is 500 pounds.

(A) Find an equation for $D(q)$

(B) If the Supply function for sugar is

$$p = S(q) = 1.4q - 0.6,$$

find the equilibrium quantity and the equilibrium price.