Math 1324

Name _____

Module 5 Lab
3.1-3.6, Appendix A

Instructions: Work each of the following problems in the space provided. You must show all work to receive full credit. Simplify and clearly indicate all answers.

1. Suppose a company has a cost function of $C(x)=\frac{3}{5}x^2+122x+3800$ where x is the total number of units produced. The selling price is given by the equation $\left(8250-\frac{2}{5}x\right)$ dollars per unit.

a. Write an equation for the revenue function $R(x)$.

b. Find the equation of the profit function $P(x)$. Show work.

c. Using the profit function $P(x)$, find the maximum profit and the number of units that must be sold to maximize profit. Write answer in a complete sentence.

2. If the supply function for a commodity is $p=q^2+20q$ and the demand function is $p=-2q^2+10q+3000$, find the equilibrium quantity and equilibrium price. Show algebraic work. With a complete sentence explain the meaning of your answers.

3. A company has total costs $C(x) = 1900 + 200x - x^2$ and total revenue given by $R(x) = 400x - 2x^2$. Find the break-even point(s) if $0 \leq x \leq 100$. Show work.

4. Requests for gun background checks in Texas in 2012 are given below. Months Jan - Dec are shown.

Month	1	2	3	4	5	6	7	8	9	10	11	12
# of Gun Background Checks	96384	130671	112295	88967	88037	89047	93179	117218	108217	112630	149921	239966

a. Look at a scatterplot of this data.

Do you think a linear model would fit this data? _____

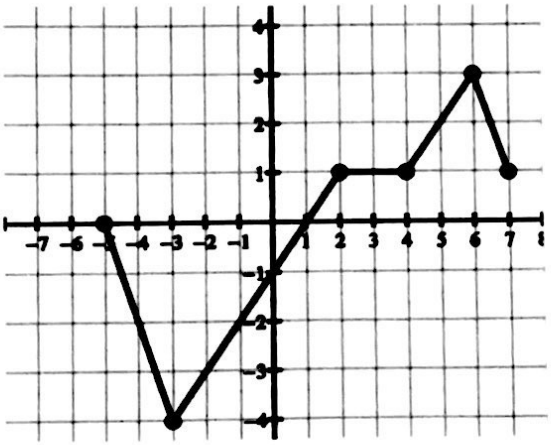
Do you think a quadratic model would fit this data? _____

Do you think a cubic (x^3) model would fit this data? _____

b. Enter the x and y data in two lists in your calculator. Obtain the equation for a cubic model. Round coefficients to 3 decimal places. Write it here:

c. Use the model to predict the number of gun background checks in Texas in December of 2012 (x=12). Did the model predict a higher number or a lower number of background checks as compared to the actual observed value from the table?

5. Use the given graph to answer the following questions.



a. State the coordinates of the x-intercept(s).

b. State the coordinates of the y-intercept.

c. State the domain in interval notation.

d. State the range in interval notation.

6. For the functions $f(x) = 4x^2 + 10$ and $g(x) = 10x - 3$

a. Find and simplify $(f - g)(x)$

b. Find the difference quotient, $\frac{f(x+h) - f(x)}{h}$, for f

c. Find and simplify $(fg)(x)$

d. Find and simplify $(g \circ f)(x)$

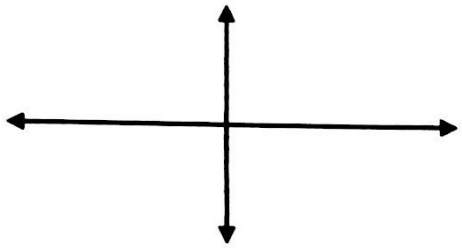
7. Let $k(x) = x^3 - 4x^2$

a. State the degree of the given polynomial._____

b. What is the most total number of peaks and valleys of the graph of the given polynomial? _____

c. Find the x-intercepts of $k(x)$.

d. Graph the general shape of the given polynomial. Label units on x-axis.



8. A taxi driver must pay a daily fee of \$85 to the cab company and has marginal costs of \$0.60 per mile.

a. Find the daily cost function $C(x)$

b. Find the average cost function $\bar{C}(x)$

c. Find $\bar{C}(70)$

d. Find $\bar{C}(300)$

e. Find the horizontal asymptote of $\bar{C}(x)$, and explain what it means in practical terms.