HOMEWORK 3 - MATH 140

DUE DATE: Monday, September 19
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Solve the following quadratic equations with the method indicated:
   (a) $3x^2 + 5x + 2 = 0$ by factoring.
   (b) $2x^2 - 3x - 1 = 0$ by completing the square.
   (c) $\frac{2}{3}x^2 - x - 3 = 0$ by using the quadratic formula.
2. Solve the following equations that are quadratic in form:
   (a) $x^4 - 5x^2 + 4 = 0$
   (b) $(2 - x)^2 + (2 - x) - 20 = 0$
3. Graph the following quadratic equations by hand:
   (a) $f(x) = -x^2 + 4x$
   (b) $g(x) = 2x^2 + 5x + 3$
4. The marginal cost C in dollars of manufacturing x cell phones is given by $C(x) = 5x^2 - 200x + 4000$. How many cell phones should be manufactured to minimize the marginal cost? What is the minimum marginal cost?
5. Solve the following quadratic inequalities:
   (a) $x^2 + 7x < -12$
   (b) $6(x^2 - 1) \geq 5x$
6. A ball is thrown upward with an initial velocity of 96 feet per second. The distance s in feet of the ball from the ground after t seconds is $s(t) = 96t - 16t^2$.
   (a) At what time is the ball at its maximum height?
   (b) What is the maximum height that the ball reaches?
   (c) At what time will the ball strike the ground?
   (d) For what time t is the ball more than 128 feet above the ground?
7. The price p and the quantity x sold of a certain product obey the demand equation $p = -\frac{1}{3}x + 100, 0 \leq x \leq 300$.
   (a) Express the revenue R as a function of x.
   (b) What is the revenue if 100 units are sold?
   (c) What quantity x maximizes the revenue? What is the maximum revenue?
   (d) What price should the company charge to maximize revenue?

8. Beth has 3000 feet of fencing available to enclose a rectangular field.

   (a) Express the area A of the rectangle as a function of x, where x is the length of the rectangle.

   (b) For what value of x is the area the largest?

   (c) What is the maximum area?