Problem Set 3

Announcements

1. Test 1 will be on Friday, Feb. 16 (instead of Feb. 9 as indicated on the Tentative Course Schedule).
2. Test 1 will cover all lecture material as well as Problem Sets 0, 1, 2 and 3.
3. Model solutions to the problem sets are available in the Mathematics library in JWB.
4. There will be no surprises; if you know the lectures and problem sets well, you should not have to worry.

Instructions

1. Solve all the following problems and submit your solutions on separate sheets of paper. In particular, do not write your solutions on the margin of this problem sheet.
2. Your solutions must be neat and legible. Clearly indicate the flow of logic in your solutions.
3. Staple your solution set if you have used more than one sheet.

Problems

1. Textbook problems: 2.3.10, 2.3.29, 2.4.32, 2.4.46, 2.4.49.
2. If $f(x) = 3x^2 - \frac{2}{5}x$, simplify the following:
$$\frac{f(x+h) - f(x)}{h},$$
for $h \neq 0$.
3. Suppose the total revenue of a company can be modeled by the equation
$$R(t) = 0.25t^2 - 4t + 85,$$
where the total revenue $R(t)$ is in billions of dollars and t is the number of years past 1980. For what values of t will the total revenue equal \$75 billion?
4. Solve
$$\frac{x+1}{x^2 - 5x + 6} + \frac{x+2}{x^2 - 7x + 12} = \frac{6}{x^2 - 6x + 8}. \qquad (1)$$
Proceed as follows:
   a) Factor each of the denominators and show that their LCM (least common multiple) is
   $$m(x) = (x-2)(x-3)(x-4).$$
   b) Identify the values of x that are inadmissbile as solutions to equation (1). Hint: What values of x give us trouble, such as division by zero, square root of a negative number, etc.?
   c) Multiply the LCM $m(x)$ through equation (1), simplify and obtain a quadratic equation in x.
   d) Solve the quadratic equation you obtained in (4c). (Make sure you check whether your answer(s) indeed satisfy the original equation (1).)
5. The average cost per item for a product is calculated by dividing the total cost by the number of items. Hence, if the total cost function for x units of a product is
$$C(x) = 900 + 3x + x^2,$$
then the average cost function $\overline{C}(x)$ is given by
$$\overline{C}(x) = \frac{C(x)}{x} = \frac{900 + 3x + x^2}{x}.$$
Sketch $\overline{C}(x)$ and indicate on the graph the point of minimum average cost.