NAME: _____

Math 103L: Section 12.6. Exercise on Cost, Revenue, Profit and maximal profit.

1. A company manufactures and sells x things per week. The weekly price demand and cost functions are:

$$p(x) = 12 - 3x$$
$$C(x) = 6 + 2x.$$

   (a) Find the marginal cost function $C'(x)$.

   (b) Find the revenue function $R(x)$.

   (c) Find the marginal revenue function $R'(x)$.

   (d) Find the maximum revenue.

2. Continuing with a company that manufactures and sells x things per week. The weekly price demand and cost functions are:

$$p(x) = 12 - 3x$$

$$C(x) = 6 + 2x.$$

Graph the Revenue and cost curves. You do not have to find the break-even points. (But it is not a bad idea to do this for practice.)

(a) Draw in the axes, label them, and mark a scale;

(b) Label $y = R(x)$, its x-intercepts, its maximum point with coordinates;

(c) Label $y = C(x)$, its y-intercept and one other point on $y = C(x)$.

(d) Shade the areas which correspond to the company making a profit make a bold line to represent the maximum profit graphically.

3. Continuing with a company that manufactures and sells x things per week. The weekly price demand and cost functions are:

$$p(x) = 12 - 3x$$

$$C(x) = 6 + 2x.$$

Sum Find the production *level* that will realize that maximum profit.

4. Theory questions:

   (a) Sum Explain why profit is maximized when marginal revenue equals marginal cost.

   (b) Sum If marginal revenue is at \$2.50 per unit produced, explain using math and words why and how production should be changed (increased? decreased?).

   (c) Sum If the fixed costs to produce wigits increases from 6 to 7, does the output level which maximizes profit increase? decrease? or remain the same? Why? (Note: You do not have to compute here.)

   (d) Sum If the variable costs decrease to \$0 per item, where will profits be maximized?

   (e) Sum If the variable cost to produce each wigit increases to 3, will your answer to (a) change? How? Why? (Note: You do not have to compute here.)

5. More practice: Repeat question 1, 2 and 3 with

$$p(x) = 16 - 2x$$

$$C(x) = 16 + 3x$$

and use the following as the theory questions.

(a) Sum If marginal revenue is at \$2.50 per unit produced, explain using math and words why and how production should be changed (increased? decreased?).

(b) Sum If the fixed costs to produce wigits decreases from 16 to 15, does the output level which maximizes profit increase? decrease? or remain the same? Why? (Note: You do not have to compute here.)

(c) Sum If the variable cost to produce each wigit decreases to 2, will your answer to (a) change? How? Why? (Note: You do not have to compute here.)