Section 2.5 Applications of Derivatives (Minimum homework: 1-9 odds)

1) The cost function for producing x units of a certain product is: $C(x) = 0.1x^2 + 8x + 100$,

- a) Find C(100)
- b) Interpret your answer to part a.
- c) Create the marginal cost function C'(x) for this product.
- d) Find C'(100)
- e) Interpret your answer to question part d.

$$C(100) = 0.1(100)^{2} + 8(100) + 100$$

C(100) = 1900

1b) The cost to produce 100 units of the product is \$1,900

1c)
$$C'(X) = \overline{C(0.1 X)} + 8$$

 $C'(x) = 0 + 0 \cdot 2 \times + 8$
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1e) It will cost an additional \$28 to produce the 101st unit of the product.

3) Suppose that the cost in dollars to make x cell phone cases is given by: $C(x) = \ln(x) + 2x$

- a) Find C(100) (round to 2 decimals)
- b) Interpret your answer to part a.
- c) Create the marginal cost function C'(x) for this product.
- d) Find C'(100) (round to 2 decimals)
- e) Interpret your answer to question part d.

$$\begin{array}{l} 3a) \quad C(100) = Ln(100) + 2(100) \\ = 204,60517 \end{array}$$

C(100) = 204.61

3b) It will cost \$204.61 to produce 100 cell phone cases.

$$_{3c)} C'(x) = \frac{1}{x} + 2$$

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3d) $C'(100) = \frac{1}{100} + 2$

$$C'(100) = 2.01$$

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3f) It will cost an additional \$2.01 to produce the 101st cell phone case.

5) Bob's Bobble heads company determines the profit function for producing and selling a certain bobble head can be modeled by: $P(x) = -0.001x^2 + 8x - 1000 \ 0 \le x \le 7000$. Where x represents the number of bobble heads sold and P(x) represents the monthly profit in dollars.

a) Find P(1000)

- b) Interpret your answer to part a. (round your answer to 2 decimals)
- c) Create the marginal profit function P'(x) for this product.
- d) Find P'(1000).
- e) Interpret your answer to part d.

 $5a) P(1000) = -0.001(1000)^{2} + 8(1000) - 1000)^{2}$

P(1000) = 6000

5b) The monthly profit is \$6,000 in a month in which 1000 bobble heads are sold.

5c) P'(x) = 2(-.001) X + 8

$$P'(x) = -0.002x + 8$$

5d) $P'(1000) \simeq -0.002(1000) + 8 \simeq 6$

P'(1000) = 6

5e) An additional \$6 of profit will be earned by selling the 1001st bobble head.

7) A self-employed person determines that the weekly profit from his current vending machine route can be modeled by: $P(x) = 10x - \sqrt{x}$ $0 \le x \le 200$; where x represents the number of vending machines stocked and P(x) represents the weekly profit.

a) Find P(64)

- b) Interpret your answer to part a. (round your answer to 2 decimals)
- c) Create the marginal profit function P'(x) for this product.
- d) Find P'(64). (round to 2 decimals)
- e) Interpret your answer to part d.

7a)
$$P(64) = 10(64) - 564 = 632$$

P(64) = 632

7b) The profit will be \$632 in a week in which 64 vending machines are stocked.

7c)
$$P(x) = 10x - \frac{1}{2}x^{1/2}$$

$$P'(x) = 10 - \frac{1}{2\sqrt{x}}$$

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$$P'(x) = 10 - \frac{1}{2\sqrt{x}}x^{-1/2}$$

7e) An additional profit of \$9.94 will be earned by stocking the 65th vending machine.

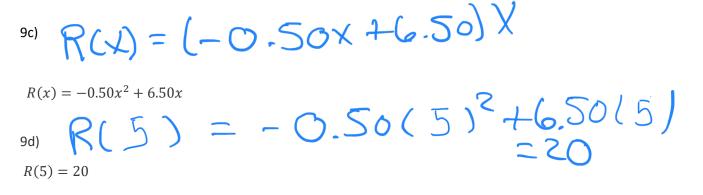
9) A Sun City couple has a small garden, and they grow blueberries. They have found the price-demand function is: p(x) = -0.50x + 6.50

Where x is the number of quarts of blueberries demanded and p(x) represents the price per quart in dollars.

- a) Find p(5) round to 1 decimal.
- b) Interpret you answer to part a.
- c) Create a revenue function R(x) hint R(x) = x * p(x) (revenue = quantity*price)
- d) Find R(5).
- e) Interpret your answer to part d.
- f) Find the marginal revenue function R'(x).
- g) Find R'(5).
- h) Interpret your answer to part g.

$$P_{a} = P(5) = -0.50(5) + 6.50 = 4$$

9b) at a price of \$4 per quart, 5 quarts will be demanded



9e) The revenue will be \$20 when 5 quarts of blueberries are sold.

9f)
$$R'(X) = Z(-0.50)X + 6.50$$

 $R'(x) = -x + 6.5 = -1X + 6.50$
9g) $R'(5) = -1(5) + 6.50$
 $R'(5) = 1.50$

9h) An additional \$1.50 of revenue will be earned when the 6th quart of blueberries is sold.