

### 3.5 Applications of Extrema (Minimum Homework: 1, 3, 5)

1) A company makes a single product. The cost function for the product is given by:

$C(x) = 0.5x^2 + 50x + 200$  where  $C(x)$  is the total cost to produce  $x$  units of the product.

The demand function is given by  $p(x) = -x + 110$ , where  $p(x)$  is the price to sell  $x$  units of the product.

- Create a revenue function.
- Create a profit function.
- How many units must the company produce and sell to maximize profit?
- What is the maximum profit?
- What price per unit must be charged to make maximum profit?

2) A company makes a single product. The cost function for the product is given by:

$C(x) = 0.5x^2 + 20x + 200$  where  $C(x)$  is the total cost to produce  $x$  units of the product.

The demand function is given by  $p(x) = -2x + 100$ , where  $p(x)$  is the price to sell  $x$  units of the product.

- Create a revenue function.
- Create a profit function.
- How many units must the company produce and sell to maximize profit?
- What is the maximum profit?
- What price per unit must be charged to make maximum profit?

3) The marketing research department of Shank, a quarterly magazine for beginning golfers, has determined that the price-demand equation for the magazine is approximated by

$$p(x) = -0.1x + 200$$

where  $x$  represents the number of magazines printed and sold each quarter, in hundreds, and  $p(x)$  is the price, in dollars, of the magazine. The cost of printing, distributing, and advertising is given by

$$C(x) = 0.2x^2 + 50x + 3000$$

- Create a revenue function.
- Create a profit function.
- How many units must the company produce and sell to maximize profit?
- What is the maximum profit?
- What price per unit must be charged to make maximum profit?

4) A headphone determines that to sell  $x$  units of a new headphone, the price demand equation for the headphones is given by  $p(x) = -x + 100$ . It also determines that the total cost  $C(x)$  of producing  $x$  units is given by  $C(x) = 2x + 50$ .

- Create a revenue function.
- Create a profit function.
- How many units must the company produce and sell to maximize profit?
- What is the maximum profit?
- What price per unit must be charged to make maximum profit?

5) The daily production cost  $C(x)$  for a factory to manufacture  $x$  deluxe contour chairs is given to be  $C(x) = \frac{1}{2}x^2 + 14x + 500$ . The price demand function is  $p(x) = -\frac{3}{2}x + 150$  where  $p(x)$  is the price needed to sell  $x$  – chairs.

- Create a revenue function.
- Create a profit function.
- How many units must the company produce and sell to maximize profit?
- What is the maximum profit?
- What price per unit must be charged to make maximum profit?

6) The Double B Corporation analyzed the production costs for one of its products and determined that the daily cost function can be given by  $C(x) = \frac{1}{2}x^2 + 20x + 5000$

where  $x$  is the number of units produced each day. The price demand function is given by:

$$p(x) = -\frac{1}{2}x + 150$$

- Create a revenue function.
- Create a profit function.
- How many units must the company produce and sell to maximize profit?
- What is the maximum profit?
- What price per unit must be charged to make maximum