

Graphing & Optimizing Profit

5.3 – Maximum Profit

price function = $p(x)$

Quantity = x

$$R(x) = p(x) \cdot x$$

$$C(x) = (\text{Variable cost})x + (\text{fixed cost})$$

$$P(x) = R(x) - C(x)$$

$x = \text{phones sold per week}$

Ex A: Maximizing a Company's Profit

It costs Teleco Inc \$70 to produce each phone, and fixed costs (rent and other costs that do not depend on the amount of production) are \$100 per week. The company's price function is $p(x) = 270 - 10x$, where p is the price at which exactly x phones will be sold.

$$C(x) = \$70x + 1000$$

$$R(x) = p(x) \cdot x$$

$$= (270 - 10x)x$$

$$R(x) = 270x - 10x^2$$

$$P(x) = R(x) - C(x)$$

$$= (270x - 10x^2) - (70x + 1000)$$

$$P(x) = -10x^2 + 200x - 1000$$

How many phones should be produced each week to maximize profit?

$$P'(x) = -20x + 200$$

$$0 = -20x + 200$$

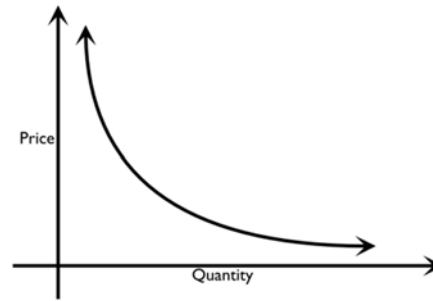
$$-200 = -20x$$

$$10 = x$$

$$P''(x) = -20$$

$$P''(10) = \text{neg, concave DN, MAX}$$

Price and quantity are inversely related.



At maximum profit:

$$(\text{Marginal Revenue}) = (\text{Marginal Cost})$$

For what price should they be sold?

$$p(10) = 270 - 10(10)$$

$$= 270 - 100$$

$$p(10) = \$170$$

What is the company's maximum profit?

$$P(10) = -10(10)^2 + 200(10) - 1000$$

$$= -10(100) + 2000 - 1000$$

$$= -1000 + 1000$$

$$P(10) = 900$$

Sentence Answer:

In order to maximize profit at \$900 per week, he should sell 10 phones per week at a price of \$170 each.

Graphing & Optimizing Profit

5.3 – Maximum Profit

Ex B: Maximizing Profit from MC and MR.

Jim's Discount Lion Cage's CEO, Bair Leah Live, hires an accountant to find his marginal cost and marginal revenue functions. The accountant finds $MC(x) = 8000$ and $MR(x) = 22,000 - 140x$, where x is the number of lion cages produced and sold per month. Find the maximum number of lion cages Bair Leah Live should sell to maximize his profit.

$$x = \text{\# of lion cages}$$

AT MAX Profit, $MC = MR$

$$8000 = 22,000 - 140x$$

$$-14,000 = -140x$$

$$100 = x$$

Bair Leah Live should sell 100 lion cages to maximize his profit.