

Section 1.4

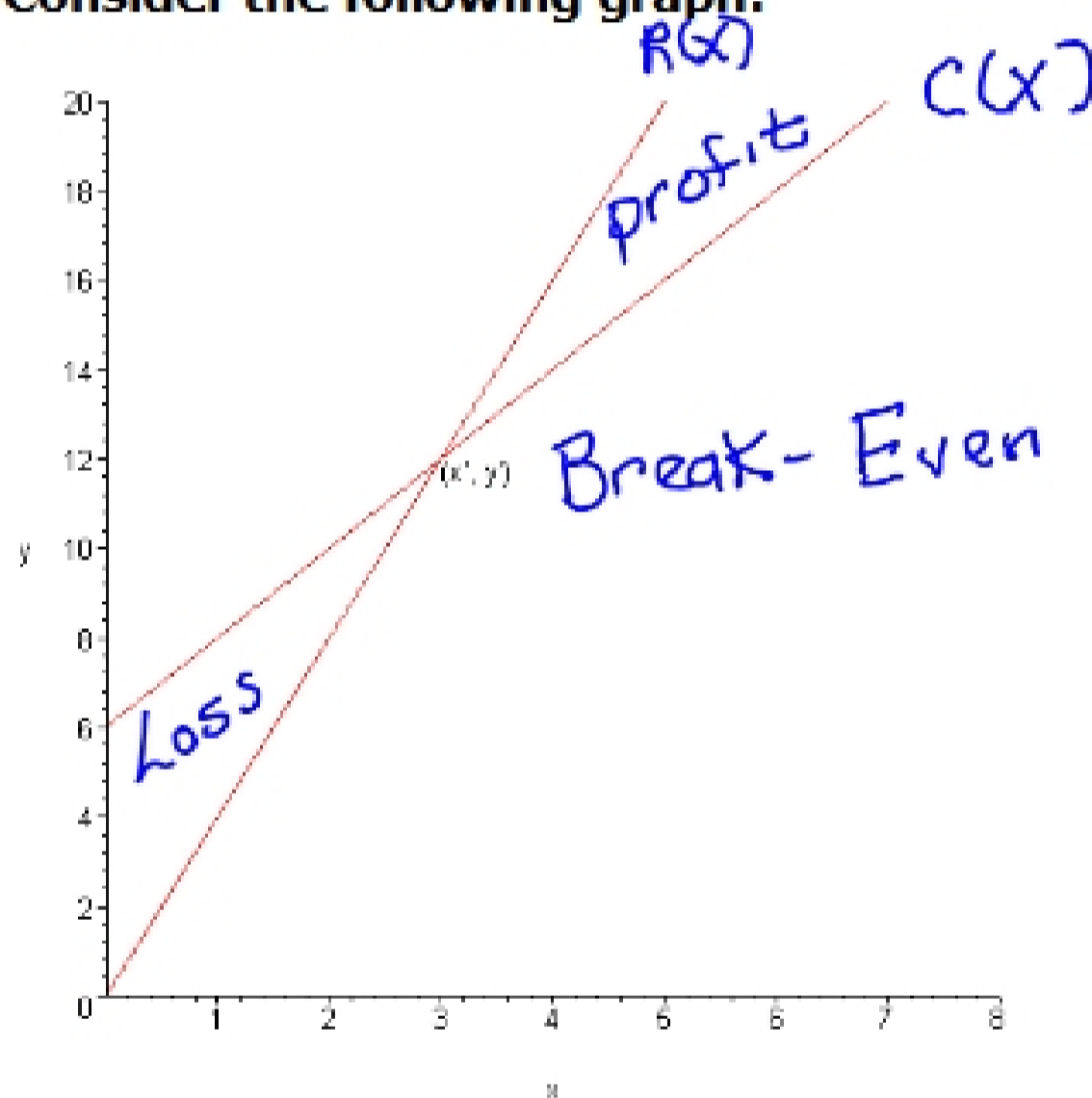
Break Even Analysis

The break even level of operation- is when the company neither makes a profit nor sustains a loss.

Note: The break even level of operation is represented by the point of intersection of two lines.

The break even level of production means the profit is zero.

Consider the following graph:



The point (x', y') is referred to as the break even point.

x' = break even quantity

y' = break even revenue

If $x < x'$ then $R(x) < C(x)$, therefore $P(x) = R(x) - C(x) < 0$ so you will have a loss.

cost is more than revenue

If $x > x'$ then $R(x) > C(x)$, therefore $P(x) = R(x) - C(x) > 0$ so you will have a profit.

revenue is more than cost

Example 1:

Find the break-even quantity and break-even revenue if

$$C(x) = 4x + 44,540 \text{ and } R(x) = 150x.$$

$$R(x) = C(x)$$

$$150x = 4x + 44,540$$

$$146x = 44,540$$

$$x = \frac{44,540}{146} = 305 \text{ units}$$

$$R(x) = 150x$$

$$R(305) = 150(305) \\ = \$45,750$$

Break-even
point
(305, 45750)

Example 2: The XYZ Company has a fixed cost of \$20,000, a production cost of \$12 for each unit produced and a selling price of \$20 for each unit produced.

$$R(x) = 20x$$

$$C(x) = 12x + 20,000$$

a. Find the break even point for the firm.

$$R(x) = C(x)$$

$$20x = 12x + 20,000$$

$$8x = 20,000$$

$$x = \frac{20,000}{8} = 2500 \text{ units}$$

$$R(x) = 20x$$

$$R(2500) = 20(2500) \\ = \$50,000$$

Break-even point
(2500, 50000)

b. If the company produces and sells 2000 units, would they obtain a profit or loss?

$$2,000 < 2500 \rightarrow \text{Loss}$$

c. If the company produces and sells 3000 units, would they obtain a profit or loss?

$$3000 > 2500 \rightarrow \text{profit}$$

Example 3:

A bicycle manufacturer experiences fixed monthly costs of \$124,992 and variable costs of \$52 per standard model bicycle produced. The bicycles sell for \$100 each. How many bicycles must he produce and sell each month to break even? What is his total revenue at the point where he breaks even?

$$C(x) = 52x + 124,992$$

$$R(x) = 100x$$

$$R(x) = 100x$$

$$R(2604) = 100(2604)$$

$$R(x) = C(x)$$

$$= \$260,400$$

$$100x = 52x + 124,992$$

$$48x = 124,992$$

$$x = \frac{124,992}{48} = 2604 \text{ units}$$

Break-Even

$$(2604, 260400)$$

units

revenue

Example 4:

Ty King owns a small publishing house printing specialty books. His **fixed costs are \$525** and the total cost to produce **1000 copies** of the book is **\$2675**. His books **sell for \$4.95** each. Find the break-even point?

$$C(x) = cx + F$$

$$R(x) = C(x)$$

$$2675 = C(1,000) + 525$$

$$4.95x = 2.15x + 525$$

$$c = 2.15/\text{unit}$$

$$2.8x = 5.25$$

$$x = \frac{5.25}{2.8} = 187.5 \rightarrow$$

188 units

$$R(x) = 4.95x$$

$$R(x) = 4.95x$$

$$R(188) = 4.95(188)$$

$$= \$930.60$$

Break-even point

revenue

$$(188, 930.60)$$