



## Linear Cost, Revenue and Profit Functions

Let  $x$  be the number of units of a product manufactured or sold at a company then:

The **cost function**,  $C(x)$ , is the total cost of manufacturing  $x$  units of the product.

**Fixed costs** are costs that remain more or less constant regardless of the company's activity level.

Example: rental fees and executive salaries

**Variable costs** are costs that vary with production or sales.

Example: wages and costs for raw material

The **revenue function**,  $R(x)$ , is the total revenue realized from the sale of  $x$  units of the product.

The **profit function**,  $P(x)$ , is the total profit realized from manufacturing and selling  $x$  units of the product.

### Formulas

Suppose a company has fixed cost of  $F$  dollars, production cost of  $c$  dollars per unit and selling price of  $s$  dollars per unit then

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

$$R(x) = sx$$

$$P(x) = R(x) - C(x) = (s - c)x - F$$

where  $x$  is the number of units of the product produced and sold.

Example 2: A manufacturer has a monthly fixed cost of \$100,000 and a production cost of \$14 for each unit produced. The product sells for \$20 per unit.

a. Find the cost, revenue and profit functions.

b. Compute the profit (loss) corresponding to production levels of 15,000 units and 27,500 units.

Example 3: A company that manufactures motorcycle helmets has monthly fixed costs of \$55,000 and monthly cost of \$21 per helmet. The selling price for each unit is \$41.

a. How many helmets must the company produce and sell if they wish to make a profit of \$50,000?

b. What is the profit (loss) if they produce and sell 3500 helmets?