

Reference 5: Business Terminology

In our course, we will study hypothetical business examples in which a company makes and sells some item. The simplifying assumptions are

- The items are manufactured in batches.
- All of the items manufactured are sold, and they are all sold for the same price per item.

Here is the Business Terminology that we will be using.

Demand, x (small letter), is a variable that represents the number of items made. This sounds simple enough, but there can be complications. For example, in some problems, x represents the number of thousands of items made.

Price, p (small letter), is a variable that represents the selling price per item.

The **Price Demand Equation** is just what it says: an equation that relates the Price p and the Demand x . For example $2x + 3p = 10$ could be a Price Demand Equation.

In some situations, the Price Demand Equation can be solved for one variable in terms of the other. For example, the equation above can be solved for p in terms of x . It would read $p = -\frac{2}{3}x + \frac{10}{3}$. When this is done, notice that the equation describes Price p as a function of Demand x . We could use function notation to indicate this, writing $p(x) = -\frac{2}{3}x + \frac{10}{3}$.

Revenue, R (capital letter), is the amount of money that comes in from the sale of the x items that are made. Because of our simplifying assumptions listed above, we can say that

$$\begin{aligned} \text{Revenue} &= (\text{number of items sold}) \cdot (\text{selling price per item}) \\ \text{Revenue} &= \text{Demand} \cdot \text{Price} \\ R(x) &= x \cdot p(x) \end{aligned}$$

Cost, $C(x)$ (capital letter C), is a function that gives the cost of making the batch of x items.

We say that the company **Breaks Even** when Revenue = Cost. That is, when $R(x) = C(x)$.

Profit, $P(x)$ (capital letter P), is a function defined as follows

$$\begin{aligned} \text{Profit} &= \text{Revenue} - \text{Cost} \\ P(x) &= R(x) - C(x) \end{aligned}$$

The expression **Average Quantity**, denoted by the symbol $\overline{\text{Quantity}}$, means $\frac{\text{Quantity}}{x}$. That is, Average Revenue is $\bar{R}(x) = \frac{R(x)}{x}$, Average Cost is $\bar{C}(x) = \frac{C(x)}{x}$, and Average Profit is $\bar{P}(x) = \frac{P(x)}{x}$.

The expression **Marginal Quantity** means **The Derivative of Quantity**.

That is, **Marginal Revenue** is $R'(x)$, and **Marginal Cost** is $C'(x)$, and **Marginal Profit** is $P'(x)$.

The word **Marginal** can also be put in front of the Average Quantities. That is **Marginal Average Revenue** is $\bar{R}'(x)$, and **Marginal Average Cost** is $\bar{C}'(x)$, and **Marginal Average Profit** is $\bar{P}'(x)$,