Reference 7: 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

\[
Revenue = (number\ of\ items\ sold) \cdot (selling\ price\ per\ item) \\
R(x) = Demand \cdot Price
\]

**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

\[
Profit = Revenue - Cost \\
P(x) = R(x) - C(x)
\]

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

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 $\overline{R}'(x)$, and **Marginal Average Cost** is $\overline{C}'(x)$, and **Marginal Average Profit** is $\overline{P}'(x)$. 