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

\[
Revenue = (\text{number of items sold}) \cdot (\text{selling price per item})
\]

\[
R(x) = Demand \cdot Price
\]

**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 \( \overline{\text{Quantity}} \), means \( \frac{\text{Quantity}}{x} \). 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 \( \overline{P}'(x) \).