Profit-loss Analysis

- Companies use Profit-loss analysis to support decisions regarding the pricing of products and appropriate levels of production in order to maximize company profit.

- A manufacturing company has costs, C, which include **fixed costs** (plant overhead, product design, setup, and promotion) and **variable costs** (costs that depend on the number of items produced).

- The **revenue** (income) for a company, R, is the amount of money the company receives from selling its product.

- If $R < C$, the company loses money.

- If $R = C$, the company breaks even.

- If $R > C$, the company makes a profit.

Profit-loss Analysis

- Profit, P, is equal to revenue, R, minus cost, C.

- $P = R - C$.

- When $P < 0$, the company loses money (cost exceeds revenue).

- When $P = 0$, the company breaks even (cost equals revenue).

- When $P > 0$, the company makes a profit (revenue exceeds cost).

Price-demand Analysis

- Companies use a **price-demand** function, $p(x)$, often determined using historical data or sampling techniques, that specifies the relationship between the demand for a product, x, and the price of the product, p.

- A point (x, p) is on the graph of the price-demand function if x items can be sold at a price of $\$p$ per item.

- Generally, a reduction in price results in an increase in the demand, thus the graph of the price-demand function is expected to go downhill as prices increase from left to right.

- The revenue, R, is equal to the number of items sold multiplied by the price per item, $R = x \cdot p$.

Break-Even and Profit-Loss Analysis

- Cost, revenue, and profit functions are often represented symbolically as $C(x)$, $R(x)$, and $P(x)$ where the independent variable, x, represents the number of items manufactured and sold.

- These functions often have the following forms, where a, b, m, and n are positive constants determined from the context of the particular manufacturer.

- **Cost function**, $C(x) = a + b \cdot x$

  C = fixed costs + variable costs

- **Price-demand function**, $p(x) = m - n \cdot x$

  x is the number of items that can be sold at $\$p$ per item.

- **Revenue function**, $R(x) = x \cdot p = x(m - n \cdot x)$

  R = number of items sold times the price per item.

- **Profit function**, $P(x) = R(x) - C(x) = x(m - n \cdot x) - (a + b \cdot x)$.

- Be careful not to confuse the price demand function, $p(x)$ with the profit function, $P(x)$. The price function always uses the lower case, p.