

Mathematical Model for Maximizing Firm's Total Revenue

Parameters

- M : Number of different goods produced by the firm.
- N : Number of different raw materials used by the firm.
- $Available_i$: Available amount of raw material i for $i = 1, 2, \dots, N$.
- $Requirements_{ij}$: Requirement of material j for producing one unit of good i for $i = 1, 2, \dots, M$ and $j = 1, 2, \dots, N$.
- $Prices_i$: Revenue earned from selling one unit of good i for $i = 1, 2, \dots, M$.

Decision Variables

- x_i : Quantity of good i produced for $i = 1, 2, \dots, M$.

Objective Function

Maximize the total revenue:

$$\text{Maximize } Z = \sum_{i=1}^M Prices_i \cdot x_i$$

Constraints

- Non-negativity constraints for goods quantities:

$$x_i \geq 0 \quad \text{for } i = 1, 2, \dots, M$$

- Raw material availability constraints:

$$\sum_{i=1}^M Requirements_{ij} \cdot x_i \leq Available_j \quad \text{for } j = 1, 2, \dots, N$$