Mathematical Model

Parameters

- $NumParts$: Number of spare parts to be produced
- $NumMachines$: Number of machines available
- $Time_{ks}$: Time taken to make one unit of spare part k on machine s, for $k = 1, 2, \ldots, NumParts$ and $s = 1, 2, \ldots, NumMachines$
- $Profit_k$: Profit from producing one unit of spare part k, for $k = 1, 2, \ldots, NumParts$
- $Capacity_s$: Capacity of machine s for the month, for $s = 1, 2, \ldots, NumMachines$

Decision Variables

- x_k: Quantity of spare part k to be produced, for $k = 1, 2, \ldots, NumParts$

Objective Function

Maximize the total profit from the production of spare parts:

$$\text{Maximize } Z = \sum_{k=1}^{NumParts} Profit_k \cdot x_k$$

Constraints

1. Non-negativity constraints for the quantity of each spare part:

$$x_k \geq 0 \quad \text{for } k = 1, 2, \ldots, NumParts$$

2. Machine capacity constraints:

$$\sum_{k=1}^{NumParts} Time_{ks} \cdot x_k \leq Capacity_s \quad \text{for } s = 1, 2, \ldots, NumMachines$$