Mathematical Model for Optimal Trading Strategy

Parameters

- $Capacity$: Maximum storage capacity (constant)
- $HoldingCost$: Cost of holding one unit of product (constant)
- $Price_t$: Selling price in period t, for $t = 1, \ldots, N$
- $Cost_t$: Cost of buying in period t, for $t = 1, \ldots, N$

Decision Variables

- B_t: Quantity of goods bought in period t, for $t = 1, \ldots, N$
- S_t: Quantity of goods sold in period t, for $t = 1, \ldots, N$
- I_t: Inventory level at the end of period t, for $t = 1, \ldots, N$

Objective Function

Maximize the total profit over the months:

$$\max \sum_{t=1}^{N} (Price_t \cdot S_t - Cost_t \cdot B_t - HoldingCost \cdot I_t)$$

Constraints

$$I_t \geq 0 \quad \forall t = 1, \ldots, N \qquad \text{(Non-negative inventory)} \qquad (1)$$

$$S_t \geq 0 \quad \forall t = 1, \ldots, N \qquad \text{(Non-negative sales)} \qquad (2)$$

$$B_t \geq 0 \quad \forall t = 1, \ldots, N \qquad \text{(Non-negative purchases)} \qquad (3)$$

$$I_t \leq Capacity \quad \forall t = 1, \ldots, N \qquad \text{(Storage capacity)} \qquad (4)$$

$$I_t = I_{t-1} + B_t - S_t \quad \forall t = 1, \ldots, N \qquad \text{(Inventory balance)} \qquad (5)$$

$$I_0 = 0 \qquad \text{(Initial inventory)} \qquad (6)$$