SHOP ORDERING PROBLEM

$\Pi = \{\pi_1, \pi_2, \ldots, \pi_\theta\}$ set of products

$\Omega^t = \{w_1^t, w_2^t, \ldots, w_{N^t}^t\}$ set of orders of day t

$\Sigma = \{s_1, s_2, \ldots, s_M\}$ set of suppliers

θ : number of different products

M : number of suppliers

N^t : number of orders for day t

p_i : selling price of each product for $i \in [1, \theta]$

D_t^i : number of product i sold in day t

I_t^i : number of product i in inventory in day t

O_t^i : number of product i ordered in day t

$k_t^{s_j}$: number of type of products ordered in day t from supplier s_j

C_{fix} : fixed cost

$C_{s_j}^i$: cost of product i from supplier s_j

C_{Ht} : cost for holding unsold products

C_{UD_t} : cost for unsatisfied demand

$Disc(\,)$: discount function

each day is sold $\min [D_t^i, I_t^i]$

- **Order cost:**

$$Cord(S_j, t) = C_{fix} + \sum_{i=1}^{K} O_t^i \cdot C_{S_j}^i - Disc\left(\sum_{i=1}^{K} O_t^i\right)$$

$$\min\left(\sum_{n=1}^{N^t} Cord_n(S_j, t)\right)$$ ← minimization of orders cost

- **Unsatisfied demand cost:**

(only if $D_t^i > I_t^i$)

$$C_{UD_t} = \sum_{i=1}^{\theta} (D_t^i - I_t^i) \cdot p_i \cdot \mathbb{1}(D_t^i > I_t^i)$$

- **Holding cost:**

$$C_{H_t} =$$

- **Profit:**

$$Pr^t = (D_i^t \cdot p_i) - \left(\sum_{n=1}^{N^t} Cord_n(S_j, t)\right) - C_{UD_t} - C_{H_t}$$

- FIXED DATA:

D_i^t, I_i^t, p_i, $C_{fix}(S_j)$, $C_i(S_j)$, $Disc(S_j?)$