**Deliverable 1-a: Modelling and Deterministic Optimization**

* **Sets**

*Warehouse：w ∈ W = {1, 2, 3}*

*Neighboring warehouse: q∈ W = {1, 2, 3}*

*Stage t∈ T = {1, 2, ...}*

* **Variables**

*：At stage t, warehouse w can order an amount of coffee from external suppliers*

*: storage level of w at t*

*: the missing amount*

*: At stage t, the amount of coffee is sent from warehouse w to the neighboring warehouse q*

*: At stage t, the amount of coffee is received by the neighboring warehouse q*

* **Parameters**

*p: the price of ordering coffee*

*: the cost of failing to miss the demand*

*：the per-unit transportation cost*

*: each warehouse can store coffee up to a capacity limit*

*: daily transportation limit*

*: demand*

* **Objective model**

*Min cost =*

* **Constraints**

1. Storage capacity: ,∀w,t
2. Transportation capacity: ,∀w,t,q
3. Inventory balance: = + +- ,∀w,t,q
4. ,∀w,t,q
5. =0, when w=q
6. , *, ,* , ,∀w,t,q

**Deliverable 1-b:** **The Expected-Value Benchmark**

* **Sets**

*Warehouse：w ∈ W = {1, 2, 3}*

*Neighboring warehouse: q∈ W = {1, 2, 3}*

*Stage t∈ T = {1, 2, ...}*