Assignment 1 - Linear Programming - Section A

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Sets

Q quarters
C cities

Data

i_c current number of barrels in city $c \in C$ [1]
d_{cq} predicted demand of barrels in $c \in C$ for quarter $q \in Q$
c_q predicted cost of dollars per barrel for quarter $q \in Q$

Decision Variables

x_{cq} number of barrels to deliver to city $c \in C$ in quarter $q \in Q$

Minimize cost

$$\sum_{c \in C q \in Q} 25 \cdot stored(c, q) \; + \; x_{cq} c_c$$

subject to

$$\sum_{c \in C} x_{cq} \leq 10000 \quad \forall q \in Q$$

$$stored(c, q) \geq 0 \text{[2]} \quad \forall c \in C \; \forall q \in Q$$

where

$$stored(c, q) \triangleq \begin{cases} \text{if } q = 0 & = i_c & + x_{c0} - d_{c0} \\ \text{otherwise} & = stored(c, q-1) + x_{cq} - d_{co} \end{cases}$$

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[1] i for initial
[2] This ensures that demand is met every quarter