

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 Variable

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

Minimize cost

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

subject to

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

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

where

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

¹ i for initial

²This ensures that demand is met every quarter