

# Assignment 1 - Linear Programming - Section A

Maxwell Bo

Chantel Morris

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## Sets

$Q$  quarters

$C$  cities

## Data

$i_c$  current number of barrels in city  $c \in C$ <sup>1</sup>

$d_{cq}$  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

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

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

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

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<sup>1</sup> $i$  for initial

<sup>2</sup>This ensures that demand is met every quarter