TIM 125/225, Lecture #17 (3/4/14)

Agenda

DONE (see above)

- Complete the process for Facilities Design
  - Capacitated Plant Location model (Step 2)
    - Steps 3 & 4

- Examples for the Capacitated Plant Location Model
  - SUN OIL, HW #7, Prob #4
  - DRY ICE, HW #7, Prob #5

= Project

- Return graded HW #5 to you
Examples:

Homework #7, Prob #4

Sun Oil

- Worked examples in the text
  - Chapter on "Network Design"

Notes:

1. For plant location we can have
   - either a low capacity plant or
   - high capacity plant at a potential
     plant location \( i, \) (\( i = 1, 2, \ldots n \)); \( n = 5 \)

   Therefore, we two sets of decision variables

\[
X_i, \quad (i = 1, 2, \ldots 5) \rightarrow \text{low capacity}
\]

\[
Y_i, \quad (i = 1, 2, \ldots 5) \rightarrow \text{plant at location } i \text{, or not?}
\]

\[
Z_i, \quad (i = 1, 2, \ldots 5) \rightarrow \text{high capacity}
\]

\[
\text{plant at location } i \text{, or not?}
\]
\[ Y_i \in (0, 1) \]
\[ Z_i \in (0, 1) \]
\[ (Y_i, Z_i) \neq (1, 1) \]

(ii) The cost (or objective) function (eqn (1) previously) becomes

\[ C = \sum_{i=1}^{n} (f_i)_{\text{low}} Y_i + \sum_{i=1}^{n} (f_i)_{\text{high}} Z_i + \sum_{j=1}^{m} \sum_{i=1}^{n} X_{ij} c_{ij} \]

\((f_i)_{\text{low}} = \text{fixed cost of low capacity plant at location } i (i=1, 2, \ldots, n)\)

\((f_i)_{\text{high}} = \text{fixed cost of high capacity plant at location } i (i=1, 2, \ldots, n)\)
(iii) Supply side constraints (previously eqn (3)):

\[ Y_i (K_{i, \text{low}}) + Z_i (K_{i, \text{high}}) \geq \sum_{j=1}^{m_j} X_{ij} \]

\( i = 1, 2, \ldots, n \)

\( (K_{i, \text{low}}) = \text{capacity of the low capacity plant at location } i \)

\( (K_{i, \text{high}}) = \text{capacity of the high capacity plant at location } i \)

(iv) Set initial values of all decision variables to zero (See Figure 4 in the text)

(v) All constraints need to written in the form \( (\quad) \geq 0 \)
HW #7, Prob #5

Dry Ice Company

- Problem was formulated in Lecture #16 for single-capacity plant at each location.

- You need to include the possibility of low & high capacity plants at each location (similar to Sun-Oil)
Project

- By next Tuesday all parts of the project should be complete

- Plan to make this happen (& e-mail this to me & TA)

- Roles & Responsibilities for every member of the team from start (Week 1) to the end (Wk 10)

- Part of the plan are new parts of the project

- Safety Inv
- Inventory Mgmt (Cycle + Safety)
- Facilities
- Transportation
- Software automation using Visual Basic