Heuristics

- The myopic algorithm identifies the \( n \) median locations.
- Customers are assigned to their closest median.
- Improvement heuristic:
  
  \[
  \text{For each } s_i \rightarrow \text{solve 1 median problem}
  \]
  
  \[
  \text{gives new locations for the medians}
  \]
  
  \[
  \rightarrow \text{reassign customers}
  \]
  
  \[
  \text{if } s_i \text{ changes stop}
  \]
  
  \[
  \text{else change } s_i \text{ and repeat}
  \]
Myopic Example

Step 1: \( k = 0 \)
Step 2: \( x_0 = \emptyset \)

Step 3:
\[
\begin{align*}
Z'_1 &= 18(11) + 5(24) + 16(33) = 846 \\
Z'_2 &= 15(24) + 16(12) + 11(25) = 837 \\
Z'_3 &= 15(18) + 16(15) + 5(25) = 625 \\
Z'_4 &= 15(11) + 12(5) + 15(33) = 720
\end{align*}
\]

Select smallest \( Z_j^c \) = open median at node 3

Myopic Example

Step 4: \( x_1 = 3 \)
Step 5: \( k < 2 \) \( k = 1 \)
Step 2: \( k = 2 \)
Step 3:
\[
\begin{align*}
Z_1^c &= 0 + 24(5) + 15(16) = 360 \\
Z_2^c &= 24(15) + 0 + 16(12) = 462 \\
Z_3^c &= 12(5) + 18(15) + 0 = 330
\end{align*}
\]

Step 4: \( x_2 = 3, 4, 3 \)
Step 5: \( k = 2 \) [STOP]

\[\Delta\]
Improvement Example

Assume starting solution is \( y_1 = y_3 = 1 \)

Create set \( S \):
- \( S_1 = \{1, 2, 3\} \rightarrow 1 \)-median sol'n: 4
- \( S_2 = \{3, 4, 5\} \rightarrow 1 \)-median sol'n: 4

New set \( S_2 = \{3, 4, 5\} \)

Remaining same, so algorithm stops.
Improvement Example

Discrete Location Models

- "Warehouse Location Problem"
- p potential warehouse locations
  - customer locations
  - p potential warehouse locations