Homework 2

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Def: x_{ij} means the quantity fror i transfer to j place,

y_i means if i warehouse was constructed, it will be one.

$$\begin{aligned}\text{Min}\quad & (x_{1A}+6x_{2A}+4x_{A1}+6x_{A2}+50)\times y_1 \\ & +(2x_{1B}+3x_{2B}+3x_{B1}+4x_{B2}+60)\times y_2 \\ & +(8x_{1C}+x_{2C}+5x_{C1}+3x_{C2}+68)\times y_3 \\ & +4x_{11}+8x_{12}+7x_{21}+6x_{22}\end{aligned}$$

S.t.

① $y_1+y_2+y_3=1$

② $\begin{cases} x_{1B}+x_{2B}\le 60 \\ x_{1C}+x_{2C}\le 70 \end{cases}$

③ $\begin{cases} x_{1A}+x_{1B}+x_{1C}+x_{11}+x_{12}=50 \\ x_{2A}+x_{2B}+x_{2C}+x_{21}+x_{22}=75 \\ x_{A1}+x_{B1}+x_{C1}+x_{11}+x_{21}=75 \\ x_{A2}+x_{B2}+x_{C2}+x_{12}+x_{22}=50 \end{cases}$

④ $\begin{cases} x_{1A}+6x_{2A}+4x_{A1}+6x_{A2}\le M\times y_1 \\ 2x_{1B}+3x_{2B}+3x_{B1}+4x_{B2}\le M\times y_2 \\ 8x_{1C}+x_{2C}+5x_{C1}+3x_{C2}\le M\times y_3 \end{cases}$

⑤ $\begin{cases} x_{1A}+x_{2A}=x_{A1}+x_{A2} \\ x_{1B}+x_{2B}=x_{B1}+x_{B2} \\ x_{1C}+x_{2C}=x_{C1}+x_{C2} \end{cases}$

$x_{ij}\ge 0 \quad \forall\ i=A,B,C,1,2$

$j=A,B,C,1,2$

\ AA, AB, AC, BA, BB, BC, CA, CB, CC

① Because only one warehouse will be constructed, the sum of y_i will be one.

② The capacity of warehouse

③ The first two constraints means the supply of point 1 and 2. The last two constraints means the demand of point 1 and 2.

④ Because only one warehouse will be construct. So it not allowed the flow go through. when y_i equal to zero. x_{ij} will be zero.

⑤ Flow conservation.