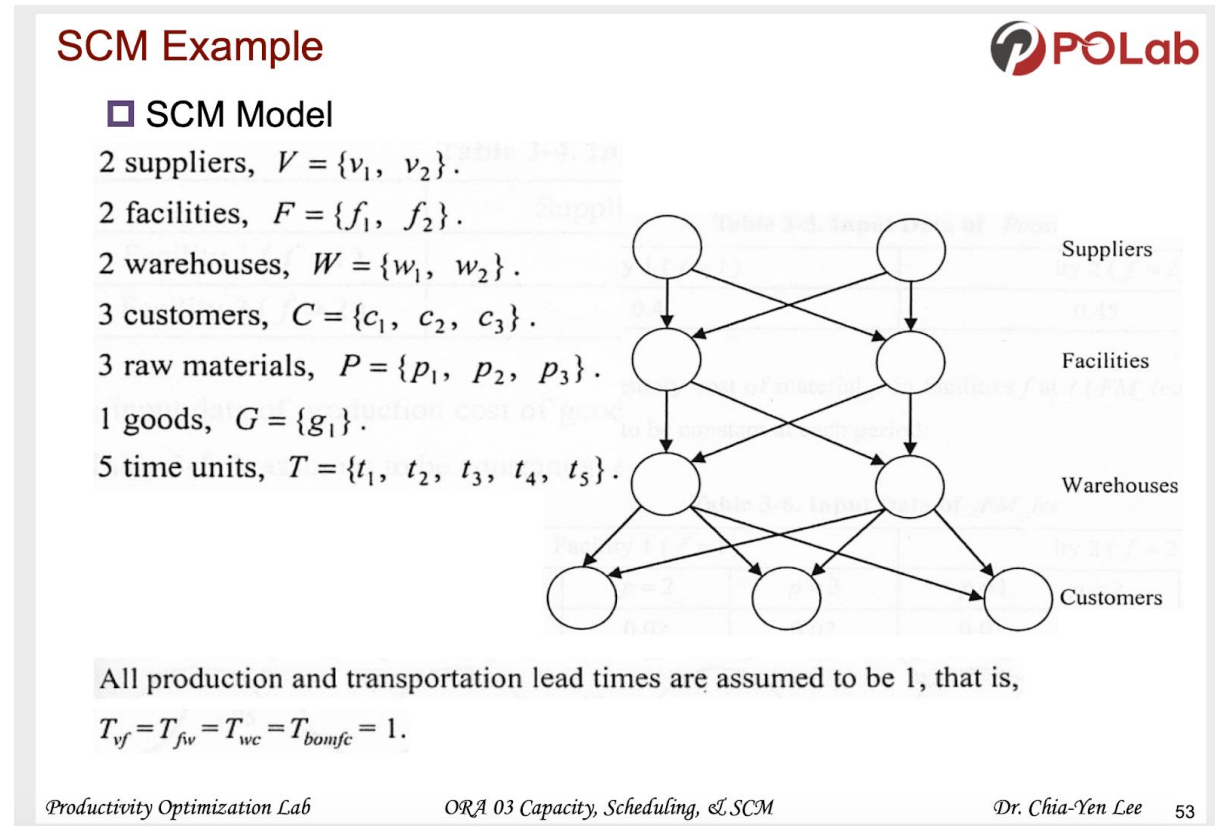


系級：資訊109  
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Q1.

(a.) Supply Chain Structure from teacher's slide



(b.)

參考 problem1.py

command line 輸入 python3 question1.py 執行

(c.)

Total cost 為 2035.22

Q2.

(a.)

$$\text{Min} \sum_{1 \leq j < k \leq n} v_{jk}(p_{jk} + q_{jk}) + \sum_{j=1}^2 \sum_{i=1}^4 w_{ji}(r_{ji} + s_{ji}) + \sum_{1 \leq j < k \leq n} v_{jk}(yp_{jk} + yq_{jk}) + \sum_{j=1}^2 \sum_{i=1}^4 w_{ji}(yr_{ji} + ys_{ji})$$

s.t.

$$x_j - q_{jk} + p_{jk} = x_k; 1 \leq j < k \leq 2$$

$$x_j - r_{ji} + s_{ji} = a_i; 1 \leq i \leq 4, 1 \leq j \leq 2$$

$$x_j, x_k, r_{ji}, s_{ji}, q_{jk}, p_{jk} \geq 0$$

$$y_j - yq_{jk} + yp_{jk} = y_k; 1 \leq j < k \leq 2$$

$$y_j - yr_{ji} + ys_{ji} = b_i; 1 \leq i \leq 4, 1 \leq j \leq 2$$

$$y_j, y_k, yr_{ji}, ys_{ji}, yq_{jk}, yp_{jk} \geq 0$$

(b.)

參考 problem2.py

command line 輸入 python3 question2.py 執行

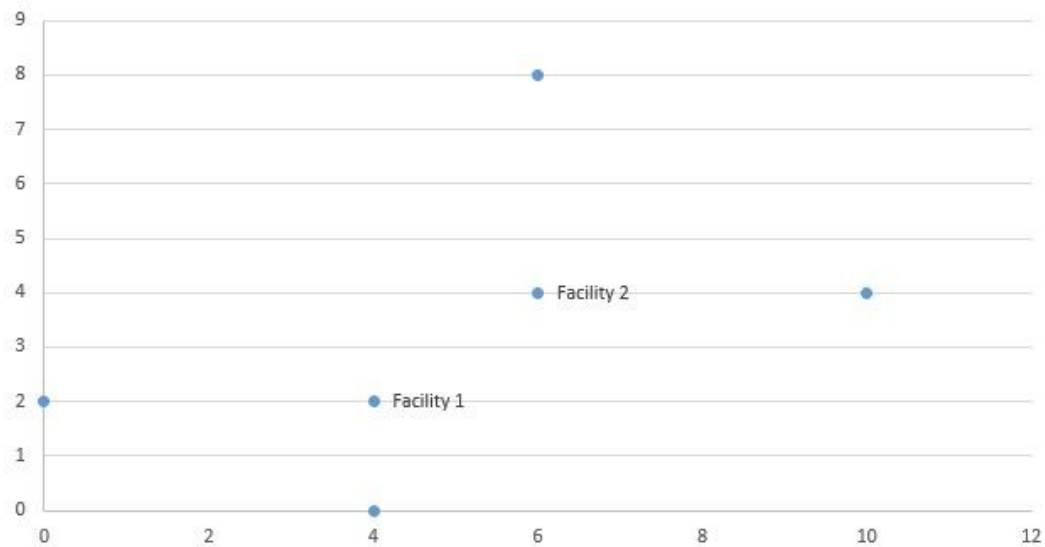
(c.)

新設施座標

$(x_1, y_1) = (6, 4)$

$(x_2, y_2) = (4, 2)$

Total Cost : 104



Q3.

(a.)

(b.)

Q4.

(a.)

(b.)

參考 problem3.py

command line 輸入 python3 question3.py 執行

(c.)

(d.)