

Module 2 Assignment

First Scenario:

- The decision variables are listed as below:
 X_1 (the number of Collegiate model backpack)
 X_2 (the number of Mini model backpack)

Two j: 1 2

- The objective function:
 $\text{Max } Z = 32 X_1 + 24 X_2$

- The constraints:
 Material limitations:
 $3X_1 + 2X_2 \leq 5000$

Sales limitations:

$$X_1 \leq 1000$$

$$X_2 \leq 1200$$

Profit limitations

$$45 X_1 + 40 X_2 \leq 40 \times 35 \times 60$$

- The full mathematical formulation for this LP problem:

$$3X_1 + 2X_2 \leq 5000$$

$$45 X_1 + 40 X_2 \leq 40 \times 35 \times 60$$

$$X_1 \leq 1000 \quad X_2 \leq 1200$$

$$X_1 \geq 0 \quad X_2 \geq 0$$

$$\text{Max } Z = 32 X_1 + 24 X_2$$

Second Scenario:

- The decision variables are listed as below:

X (Large) Y (Medium) Z (Small)

three plant: 1, 2, 3

$X_1 \quad Y_1 \quad Z_1$ (plant 1) $X_2 \quad Y_2 \quad Z_2$ (plant 2) $X_3 \quad Y_3 \quad Z_3$ (plant 3)

- The linear programming model formulation:

$$20 X_1 + 15 Y_1 + 12 Z_1 \leq 13000$$

$$20 X_2 + 15 Y_2 + 12 Z_2 \leq 12000$$

$$20 X_3 + 15 Y_3 + 12 Z_3 \leq 5000$$

$$X_1 + Y_1 + Z_1 \leq 750$$

$$X_2 + Y_2 + Z_2 \leq 900$$

$$X_3 + Y_3 + Z_3 \leq 450$$

$$X_1 + X_2 + X_3 \leq 900$$

$$Y_1 + Y_2 + Y_3 \leq 1200$$

$$Z_1 + Z_2 + Z_3 \leq 750$$

$$X_j \geq 0, \quad Y_j \geq 0, \quad Z_j \geq 0 \quad j=1, 2, 3$$

$$\text{Max} Z = 420(X_1 + X_2 + X_3) + 360(Y_1 + Y_2 + Y_3) + 300(Z_1 + Z_2 + Z_3)$$