

Assignment Module 2 - MIS 64018 Linear Programming

9/19/21 - Ryan Harris

1. Back Savers

a. Clearly define the decision variables

X_1 is the number of Collegiate backpacks produced per week

X_2 is the number of Mini backpacks produced per week

Z represents the profit per week

b. What is the objective function?

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

c. What are the constraints?

$$X_1 \leq 1,000$$

$$X_2 \leq 1,200$$

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

$$.75X_1 + .667X_2 \leq 1400$$

d. Write down the full mathematical formulation for this LP problem.

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

ST

$$X_1 \leq 1,000$$

$$X_2 \leq 1,200$$

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

$$.75X_1 + .667X_2 \leq 1400$$

2. Weigelt Corporation

a. Define the decision variables

X_1 is the number of large units produced at plant 1

X_2 is the number of large units produced at plant 2

X_3 is the number of large units produced at plant 3

Y_1 is the number of medium units produced at plant 1

Y_2 is the number of medium units produced at plant 2

Y_3 is the number of medium units produced at plant 3

Z_1 is the number of small units produced at plant 1

Z_2 is the number of small units produced at plant 2

Z_3 is the number of small units produced at plant 3

P represents the profit

b. Formulate a linear programming model for this problem

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

ST

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

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

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

$$20X_1 + 15Y_1 + 12Z_1 \leq 13,000$$

$$20X_2 + 15Y_2 + 12Z_2 \leq 12,000$$

$$20X_3 + 15Y_3 + 12Z_3 \leq 5,000$$

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

$$Y_1 + Y_2 + Y_3 \leq 1,200$$

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

$$\frac{750}{X_1 + Y_1 + Z_1} = \frac{900}{X_2 + Y_2 + Z_2} = \frac{450}{X_3 + Y_3 + Z_3}$$