Linear Programming Assignment

Question 1 - BackSavers:

1. ***Decision Variables:***

how many units of Collegiate and Mini backpacks to produce per week.

1. ***Objective Function :***

Let X1 represent number of Collegiate backpacks produced per week

Let X2 represent number of Minis backpacks produced per week

Let Z represent profit ($)

Max : Z = 32X1 + 24X2

1. ***Constraints:***

*Labor – 35 laborers that provide 40hours of labor per week*

*Material – 5000 square foot shipment of material per week*

*Sales forecast – maximum sales as 1000 Collegiates and 1200 Minis*

1. ***Mathematical formulation:***

45X1 + 40X2 ≤ 84,000

3X1 + 2X2 ≤ 5,000

X1 ≤ 1,000

X2 ≤ 1,200

Z = 32X1 + 24X2

X1 , X2 ≥ 0

Question 2 – Weigelt Corporation:

1. ***Decision Variables:***

how many units of Large, Medium and Small to produce per day.

Let X1 represent number of Large product per day for Plant 1

Let X2 represent number Medium product per day for Plant 1

Let X3 represent number Small product per day for Plant 1

Let X4 represent number of Large product per day for Plant 2

Let X5 represent number Medium product per day for Plant 2

Let X6 represent number Small product per day for Plant 2

Let X7 represent number of Large product per day for Plant 3

Let X8 represent number Medium product per day for Plant 3

Let X9 represent number Small product per day for Plant 3

Let Z represent profit ($)

Let Y1 represent plant 1

Let Y2 represent plant 2

Let Y3 represent plant 3

1. ***Objective Function :***

Z = 420X1 + 360X2 + 300X3 + 420X4 + 360X5 + 300X6 + 420X7 + 360X8 + 300X9

1. ***Constraints:***

*Storage space*

20X1 + 15X2 + 12X3 ≤ 13,000

20X4 + 15X5 + 12X6 ≤ 12,000

20X7 + 15X8 + 12X9 ≤ 5,000

*Excess capacity*

X1 + X2 + X3 ≤ 750

X4 + X5 + X6 ≤ 900

X7 + X8 + X9 ≤ 450

*Sales forecast*

X1 + X2 + X3 ≤ 900

X4 + X5 + X6 ≤ 1200

X7 + X8 + X9 ≤ 750

*Excess capacity percentage*

900(X1 + X2 + X3) − 750(X4 + X5 + X6) = 0

450(X4 + X5 + X6) − 900(X7 + X8 + X9) = 0

X1, X2, X3, X4, X5, X6, X7, X8, X9 ≥ 0