Quantitative Management Modeling

Assignment #1

Linear Programming Model

Decision Variables
- A = Collegiate backpacks
- B = Mini backpacks

Objective Function - The objective is to maximize the profit.

Mathematical Formulation:

$X = 32A + 24B$

Nylon Constraint - $3A + 2B \leq 5000$
Sales Constraint - $A \leq 1000$, $B \leq 1200$
Labor Constraint - $45A + 40B \leq 35*40*60$

Decision Variables
- A^l, A^m, and A^s = number of large, medium, and small units for plant 1
- B^l, B^m, and B^s = number of large, medium, and small units for plant 2
- C^l, C^m, and C^s = number of large, medium, and small units for plant 3

Objective - The objective is to maximize the profit

Mathematical Formulation:

(Max) $X = 420(A^l + B^l + C^l) + 360(A^m + B^m + C^m) + 300(A^s + B^s + C^s)$

Constraint 1: Production

P1 - $A^l + A^m + A^s \leq 750$
P2 - $B^l + B^m + B^s \leq 900$
P3 - $C^l + C^m + C^s \leq 450$

Constraint 2: Storage

P1 - $20A^l + 15A^m + 12A^s \leq 13000$
P2 - $20B^l + 15B^m + 12B^s \leq 12000$

P3 - $20C^l + 15C^m + 12C^s \leq 5000$

Constraint 3: Sales

Large - $A^l + B^l + C^l \leq 900$
Medium - $A^m + B^m + C^m \leq 1200$
Small - $A^s + B^s + C^s \leq 750$

Constraint 4: Same ratio

$A^l + A^m + A^s / 750 = B^l + B^m + B^s / 900 = C^l + C^m + C^s / 450$