MIS 64018 QMM
Assignment 2
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1. Back Savers is a company considering offering two different (the Collegiate and the Mini) Backpacks to students per week.

a. Clearly Define the Decision Variables

X1 = Number of Collegiate Backpacks to be Produced per week.
X2 = Number of Mini Backpacks to be Produced per week.

b. What is the Objective Function?

Maximize Profit = 32X1 + 24X2

c. What are the Constraints?

X1 ≤ 1000 maximum Collegiates sold per week.
X2 ≤ 1200 maximum Mini sold per week.

Non-Negativity:
X1 ≥ 0
X2 ≥ 0

3X1 + 2X2 ≤ 5000 (Nylon supply per week)

45X1 + 40X2 ≤ 84000 Minutes per week (35 Labor * 40 Hrs. * 60 Min.)

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

X1 ≥ 0, X2 ≥ 0

Hours
45X1 + 40X2 ≤ 84000 Minutes per week (35 people * 40 Hours * 60 Minutes)

Nylon
3X1 + 2X2 ≤ 5000 Square-foot of material per week

Total Sales ≤ 1000X1 + 1200X2

Objective Function
Maximize Profit = 32X1 + 24X2

2. The Weigelt Corporation has three branch plants with excess production capacity.

a. Define the decision variables.

Let x1, x2, x3 be the number of large-sized units produced at Plants 1, 2, and 3, respectively, per day.
Let y1, y2, y3 be the number of medium-sized units produced at Plants 1, 2, and 3, respectively, per day.
Let z1, z2, z3 be the number of small-sized units produced at Plants 1, 2, and 3, respectively, per day.

b. Formulate a Linear Programming for this Problem:

Plant Storage
@1 → $20x1 + 15y1 + 12z1 \leq 13000$
@2 → $20x2 + 15y2 + 12z2 \leq 12{,}000$
@3 → $20x3 + 15y3 + 12z3 \leq 5{,}000$

Production Capacity
@1 → $x1 + y1 + z1 \leq 750$ units
@2 → $x2 + y2 + z2 \leq 900$ units
@3 → $x3 + y3 + z3 \leq 450$ units

Sales Forecast
Large sized units → $x1 + x2 + x3 \leq 900$ units
Medium sized units → $y1 + y2 + y3 \leq 1200$ units
Small sized units → $z1 + z2 + z3 \leq 450$ units

Maximize Profit = $420 (x1+x2+x3) + 360 (y1+y2+y3) + 300 (z1+z2+z3)$