

Assignment - 1

QUESTION 1

A: DECISION VARIABLES

The number of Collegiate(**N**) and Mini(**R**) bags generated every week are the choice variables in the presented issue. It follows that there are two decision factors.

B: OBJECTIVE FUNCTION

The objective function can be understood as maximizing profits. According to the problem, **N** makes a unit profit of **\$32** dollars and **R** makes a profit of **\$24** dollars.

Maximize, $Y = 32N + 24R$

C: The problem has two constraints:

Resource constraint:

Back Savers receives **5000 sq. Ft** of nylon from their source. Each week, **3 sq. Ft** are needed for each **N**. whereas each **R** needs **2 sq. Ft**.

$$3N + 2R \leq 5000$$

Time constraint:

Each **N** needs 45 minutes of labor to earn a profit of **\$32**, while each **R** needs 40 minutes to earn a profit of **\$24**. **35** workers at Back Savers put in 40 hours a week of work each.

Here, **$35 \times 40 = 1400$** (labor hours)

$$45N + 40R \leq 84000 \text{ (labor mins)}$$

D: LP Problem formulation in mathematics:

Maximize, $Y = 32N + 24R$

Constraints,

$$N \leq 1000, N \geq 0$$

$$R \leq 1200, R \geq 0$$

$$3N + 2R \leq 5000$$

$$45N + 40R \leq 84000$$

QUESTION 2

DECISION VARIABLES

The decision variables in the given problem are

No of units(**A**)

No of plants (**N**)

Holds branch plants large, small, medium (**R**).

Thus, these aspects that influence decision-making.

OBJECTIVE FUNCTION

We can interpret the objective function as maximizing the profits. As given in the problem

Maximize, $M = ?$

$$M = 420 (A_1L + A_2L + A_3L) + 360 (A_1M + A_2M + A_3M) + 300 (A_1S + A_2S + A_3S)$$

CONSTRAINTS

$$A_1L + A_2L + A_3L \leq 750 \text{ -----Mt 1}$$

$$A_1M + A_2M + A_3M \leq 900 \text{ -----Mt 2}$$

$$A_1S + A_2S + A_3S \leq 450 \text{ -----Mt 3}$$

STORAGE LIMITS

$$20 A_1L + 15 A_1M + 12 A_1S \leq 13000$$

$$20 A_2L + 15 A_2M + 12 A_2S \leq 12000$$

$$20 A_3L + 15 A_3M + 12 A_3S \leq 5000$$

SALES FORECAST INDICATES PER DAY

$$A_1L + A_1M + A_1S \leq 900$$

$$A_2L + A_2M + A_2S \leq 1200$$

$$A_3L + A_3M + A_3S \leq 750$$

Percentage avoid layoff

$$A_1^2 + A_1^m + A_1^s / 750 * 100$$

$$A_2^2 + A_2^m + A_2^s / 900 * 100$$

$$A_3^2 + A_3^m + A_3^s / 750 * 100$$