

12 Productco produces three products. Each product requires labor, lumber, and paint. The resource requirements, unit price, and variable cost (exclusive of raw materials) for each product are given in Table 70. Currently, 900 labor hours, 1,550 gallons of paint, and 1,600 board feet of lumber are available. Additional labor can be purchased at \$6 per hour, additional paint at \$2 per gallon, and additional lumber at \$3 per board foot. For the following two sets of priorities, use preemptive goal programming to determine an optimal production schedule. For set 1:

- Priority 1 Obtain profit of at least \$10,500.
 - Priority 2 Purchase no additional labor.
 - Priority 3 Purchase no additional paint.
 - Priority 4 Purchase no additional lumber.
- For set 2:
- Priority 1 Purchase no additional labor.
 - Priority 2 Obtain profit of at least \$10,500.
 - Priority 3 Purchase no additional paint.
 - Priority 4 Purchase no additional lumber.

where

$$\begin{aligned} \min \bar{z} &= 50y_1 + 20y_2 + 30y_3 + 80y_4, \\ \text{s.t.} \quad & 400y_1 + 200y_2 + 150y_3 + 500y_4 \geq 500 && \text{(Calorie constraint)} \\ & 3y_1 + 2y_2 \geq 6 && \text{(Chocolate constraint)} \\ & 2y_1 + 2y_2 + 4y_3 + 4y_4 \geq 10 && \text{(Sugar constraint)} \\ & 2y_1 + 4y_2 + y_3 + 5y_4 \geq 8 && \text{(Fat constraint)} \\ & y_1, y_2, y_3, y_4 \geq 0 \end{aligned}$$

y_1 = number of brownies eaten daily
 y_2 = number of scoops of chocolate ice cream eaten daily
 y_3 = bottles of soda drunk daily
 y_4 = pieces of pineapple cheesecake eaten daily

Solve the Diet Problem using Matlab.
 Answer The following:

PROBLEMS (56.4)

Group A

The following questions refer to the diet problem:

- 1 If the cost of a brownie is 70¢ and a piece of cheesecake costs 60¢, does the current basis remain optimal?
- 2 If the cost of a brownie is 20¢ and a piece of cheesecake is \$1, does the current basis remain optimal?
- 3 If the fat requirement is reduced to 3 oz and the calorie requirement is increased to 800 calories, does the current basis remain optimal?
- 4 If the fat requirement is 6 oz and the calorie requirement is 600 calories, does the current basis remain optimal?
- 5 If the price of a bottle of soda is 15¢ and a piece of cheesecake is 60¢, show that the current basis remains optimal. What will be the new optimal solution to the diet problem?
- 8 If 8 oz of chocolate and 60 calories are required, show that the current basis remains optimal.