

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1) In the simplex tableau
$$\begin{array}{cccc|c} x & y & u & v & M \\ \hline 2 & 1 & 0 & 5 & 20 \\ 4 & 0 & 1 & 8 & 32 \\ \hline -3 & 0 & 0 & 2 & -9 \end{array},$$

what is the next pivot element?

2) In the simplex tableau

$$\begin{array}{cccc|c} x & y & z & u & v & M \\ \hline 0 & 12 & 6 & 12 & 1 & 0 & 24 \\ 1 & 5 & -1 & 0 & 0 & 0 & 8 \\ \hline 0 & -2 & -3 & 9 & 0 & 1 & 5 \end{array},$$

what is the next pivot element?

3) Consider the simplex tableau that is the final one in a problem to maximize $x + 2y + 3z$.

$$\begin{array}{cccc|c} x & y & z & u & v & M \\ \hline 2 & 1 & 0 & -3 & 8 & 0 & 2 \\ 3 & 0 & 1 & 5 & 2 & 0 & 5 \\ \hline 1 & 0 & 0 & 6 & 5 & 1 & 19 \end{array}$$

What is the maximum value of $x + 2y + 3z$?

4) What are the values of x , y and z when the maximum value of $x + 2y + 3z$ occurs?

Use the simplex method to solve.

5) Maximize $2x + 6y$ subject to the following constraints.

$$\begin{cases} 3x + 6y \leq 45 \\ x + y \leq 10 \\ x \geq 0, y \geq 0 \end{cases}$$

6) Maximize $M = 3x + 2y$ subject to the following constraints.

$$\begin{cases} x + y \leq 20 \\ 2x + y \leq 25 \\ x \leq 10 \\ x \geq 0, y \geq 0 \end{cases}$$

7) Maximize $M = 3x + 2y + 5z$ subject to the following constraints.

$$\begin{cases} x - 2z \leq 10 \\ x + y + 6z \leq 80 \\ x \geq 0, y \geq 0, z \geq 0 \end{cases}$$

Solve the problem.

8) Big Round Cheese Company has on hand 45 pounds of Cheddar and 49 pounds of Brie each day. It prepares two Christmas packages—the "Holiday" box, which has 5 pounds of Cheddar and 2 pounds of Brie, and the "Noel" box, which contains 2 pounds of Cheddar and 7 pounds of Brie. Profit on each Holiday assortment is \$6, profit on each Noel assortment is \$8. The initial and final tableaux are as follows:

$$\begin{array}{cccc|c} x & y & u & v & M \\ \hline 5 & 2 & 1 & 0 & 0 & 45 \\ 2 & 7 & 0 & 1 & 0 & 49 \\ \hline -6 & -8 & 0 & 0 & 1 & 0 \end{array}$$

$$\begin{array}{cccc|c} 1 & 0 & \frac{7}{31} & -\frac{2}{31} & 0 & 7 \\ 0 & 1 & -\frac{2}{31} & \frac{5}{31} & 0 & 5 \\ \hline 0 & 0 & \frac{26}{31} & \frac{28}{31} & 1 & 82 \end{array}$$

(initial) (final)

Here, x = the number of Holiday boxes per day and y = the number of Noel boxes per day.

- (a) Give the optimal production schedule and the resulting profit.
- (b) How much excess Cheddar and excess Brie remain each day if this plan is followed?