

For the next two problems consider the following linear programming problem:
 Maximize $P = 15x + 12y$ subject to the constraints:

$$\begin{aligned} 5x + 4y &\leq 20 \\ x, y &\geq 0 \end{aligned}$$

[1A] The maximum occurs for :

- (a) At $x = 0, y = 5$ and $x = 4, y = 0$ ONLY.
- (b) $x = 20, y = 20$ ONLY.
- (c) Along the line segment joining $x = 0, y = 5$ to $x = 4, y = 0$.
- (d) Along the line segment joining $x = 0, y = 5$ to $x = 20, y = 0$.
- (e) Some other value of x and y .

[2A]

The maximum is :

- (a) 10.
- (b) 20.
- (c) 40.
- (d) 60.
- (e) None of the above.

[3A] Find the value of the pivot element in the following simplex tableau:

$$\left(\begin{array}{cccccccc|c} 1 & 0 & -1 & 1 & 0 & 0 & 1 & 0 & 1 \\ 2 & 0 & -2 & 0 & 1 & 0 & 2 & 0 & -4 \\ 4 & 1 & 0 & 0 & 0 & 0 & -3 & 0 & 1 \\ -3 & 0 & 5 & 0 & 0 & 1 & -6 & 0 & 5 \\ \hline -6 & 0 & 3 & 0 & 0 & 0 & 2 & 1 & 4 \end{array} \right)$$

- (a) 3.
- (b) -2.
- (c) 2.
- (d) -1.
- (e) 5.

For the next two problems consider the following linear programming problem:
Maximize $P = 2x + 3y + 2z$ subject to the constraints:

$$\begin{aligned}2x + y + 2z &\leq 26 \\x + y - 3z &\leq 16 \\x, y, z &\geq 0\end{aligned}$$

[4A] The maximum is:

- (a) 5.
- (b) 15.
- (c) 24.
- (d) 70.
- (e) None of the above

[5A] The optimal solution is:

- (a) $x = 5, y = 8, z = 0$.
- (b) $x = 0, y = 22, z = 2$.
- (c) $x = 0, y = 22, z = 6$.
- (d) $x = 1, y = 11, z = 12$.
- (e) None of the above.

For the next two problems:

Minimize $C = -10x + 14y - 2z$ subject to the constraints:

$$\begin{aligned}2x + y + z &\leq 2 \\x, y, z &\geq 0\end{aligned}$$

[6A] The minimum is:

- (a) -5.
- (b) -10.
- (c) 5.
- (d) 10.
- (e) None of the above.

[7A] The optimal solution is:

- (a) $x = 1, y = 0, z = 0$.
- (b) $x = 0, y = 0, z = 2$.
- (c) $x = 2, y = 0, z = 0$.
- (d) $x = 0, y = 1, z = 0$.
- (e) $x = 0, y = 2, z = 0$.

For the next two problems consider the following linear programming problem:
Maximize $P = 3x - 7y + z$ subject to the constraints:

$$\begin{aligned}x - 2y + 3z &\leq -90 \\x + 2y + z &\leq 120 \\x, y, z &\geq 0\end{aligned}$$

[8A] The maximum is:

- (a) 315.
- (b) -108.
- (c) -315.
- (d) -36.
- (e) None of the above.

[9A] The optimal solution is:

- (a) $x = 6, y = 0, z = 0$.
- (b) $x = 0, y = 18, z = 0$.
- (c) $x = 6, y = 45, z = 0$.
- (d) $x = 0, y = 45, z = 0$.
- (e) None of the above.

For the next three problems:

Mom's Old-Fashioned Casseroles produces a luncheon casserole that has 50% carbohydrates, 30% protein and 20% fat and costs \$8.00 per pound. The dinner casserole has 75% carbohydrates, 20% protein and 5% fat and costs \$10.00 per pound. How much of each should be produced to provide at least 3 pounds of carbohydrates, at least 1.5 pounds of protein and at most 0.5 pounds of fat at minimum cost? [HINT: Use the graphical method.]

[10A] Amount of luncheon casserole to be produced:

- (a) None.
- (b) 1 pound.
- (c) 1.8 pounds.
- (d) 6 pounds.
- (e) None of the above.

[11A] Amount of dinner casserole to be produced:

- (a) None.
- (b) 1 pound.
- (c) 1.8 pounds.
- (d) 6 pounds.
- (e) None of the above.

[12A] Minimum cost is:

- (a) \$68.00
- (b) \$34.00
- (c) \$18.75
- (d) \$25.00
- (e) None of the above.

[13A] How many vertices has the feasible set for:

$$\begin{aligned}x - y &\leq 15 \\2x - y &\leq 15 \\x + y &\geq 6 \\x &\geq 0 \\y &\geq 0\end{aligned}$$

- (a) 1.
- (b) 2.
- (c) 3.
- (d) 4.
- (e) 5.

[14A] Is more pivoting needed in the following simplex tableau?

$$\left(\begin{array}{cccccc|cc|c} 1 & 0 & 0 & 1 & 0 & 0 & -1 & 0 & 1 \\ 5 & 3 & 1 & 0 & 0 & 0 & 2 & 0 & 3 \\ 7 & -2 & 0 & 0 & 1 & 0 & -3 & 0 & 2 \\ 4 & 4 & 0 & 0 & 0 & 1 & -6 & 0 & 3 \\ \hline 15 & 10 & 0 & 0 & 0 & 0 & 2 & 1 & 4 \end{array} \right)$$

- (a) No
- (b) Yes: Pivot about a 3
- (c) Yes: Pivot about a -3
- (d) Yes: Pivot about a -6
- (e) Yes: Pivot about a -1

[15A] Which of the following statements are true for the feasible set?

- (A) A linear objective function might not have a maximum on it
- (B) The feasible set is always convex
- (C) The feasible could be empty

- (a) A only
- (b) B only
- (c) C only
- (d) B and C only
- (e) A, B and C

NOTE: There are no problems on this practice test from Section 5.1.