3.1-4 Use the graphical method to solve the problem:

Maximize $Z = 2x_1 + x_2$, subject to

$X_2 \leq 10$

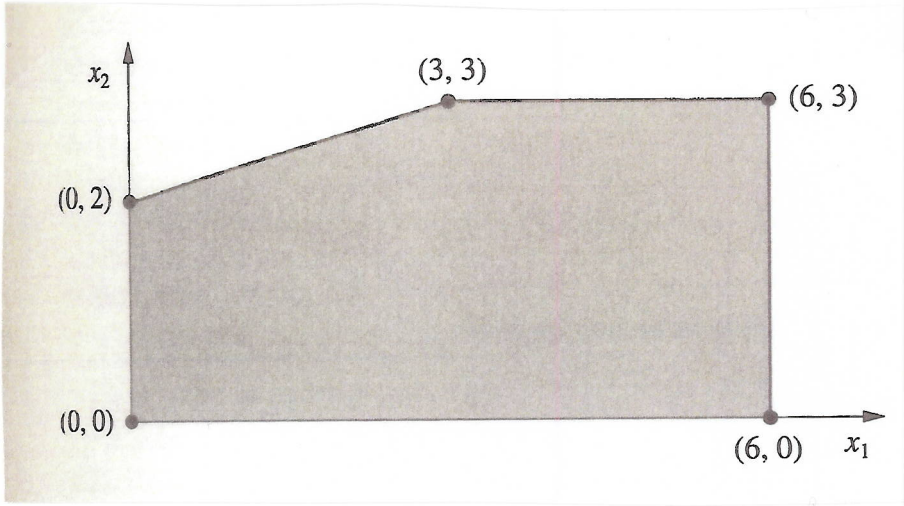
$2x_1 + 5x_2 \leq 60$

$X_1 + x_2 \leq 18$

$3x_1 + x_2 \leq 44$ and

$x_1 \geq 0 \quad x_2 \geq 0$.

3.2-2 The shaded area in the following graph represents the feasible region of a linear programming problem whose objective function is to be maximized.



Label each of the following statements as True or False, and then justify your answer based on the graphical method. In each case, give an example of an objective function that illustrates your answer.

(a) If (3, 3) produces a larger value of the objective function than (0, 2) and (6, 3), then (3, 3) must be an optimal solution.

(b) If (3, 3) is an optimal solution and multiple optimal solutions exist, then either (0, 2) or (6, 3) must also be an optimal solution.

(c) The (0, 0) cannot be an optimal solution.

3.1-12 Consider the following problem, where the value of c_1 has not yet be ascertained.

Maximize $Z = c_1x_1 + x_2$, subject to $x_1 + x_2 \leq 6$

$x_1 + 2x_2 \leq 10$ and $x_1 \geq 0, \quad x_2 \geq 0$.

Use graphed analysis to determine the optimal solution(s) for x_1, x_2) for the various possibly of

$c_1(-\infty < c_1 < \infty)$.