Math 1324 Review 3

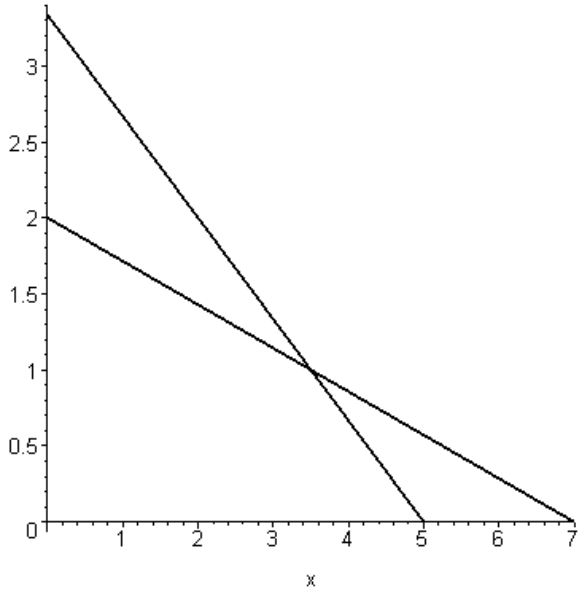
Use the method of corner points to solve the following linear programming problems.

1. Maximize and Minimize $z = 2x + 4y$

Subject to $2x + 7y \le 14$

$2x + 3y \le 10$

$x, y \ge 0$

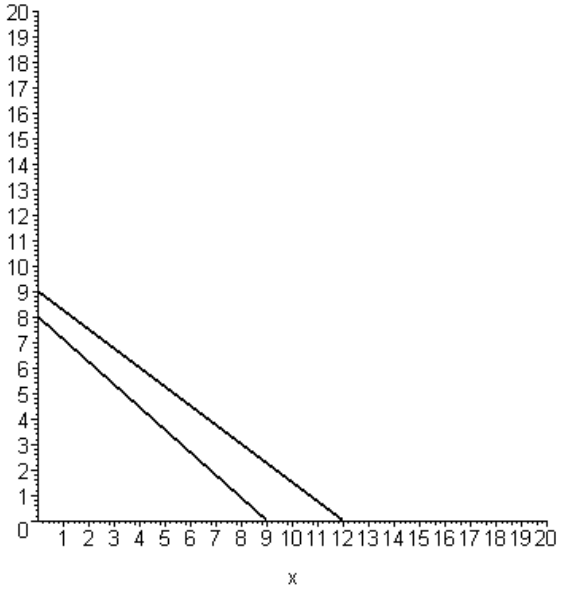


2. Maximize and Minimize $z = 10x + 2y$

Subject to $8x + 9y \ge 72$

$6x + 8y \ge 72$

$x, y \ge 0$



Use the Simplex Method to solve the following linear programming problems.

3. Maximize $z = x_1 + 3x_2$

Subject to $x_1 + x_2 \le 10$

$5x_1 + 2x_2 \le 20$

$x_1 + 2x_2 \le 36$

$x_1, x_2 \ge 0$

$$\left[\begin{array}{cccccc|c} 1 & 1 & 1 & 0 & 0 & 0 & 10 \\ 5 & 2 & 0 & 1 & 0 & 0 & 20 \\ 1 & 2 & 0 & 0 & 1 & 0 & 36 \\ \hline -1 & -3 & 0 & 0 & 0 & 1 & 0 \end{array}\right]$$

4. Maximize $z = 5x_1 + 4x_2 + x_3$

Subject to $-2x_1 + x_2 + 2x_3 \le 3$

$x_1 - x_2 + x_3 \le 1$

$x_1, x_2, x_3 \ge 0$

$$\left[\begin{array}{cccccc|c} -2 & 1 & 2 & 1 & 0 & 0 & 3 \\ 1 & -1 & 1 & 0 & 1 & 0 & 1 \\ \hline -5 & -4 & -1 & 0 & 0 & 1 & 0 \end{array}\right]$$

Solve the following Linear programming word problems.

5. A bakery makes cakes and cookies. Each batch of cakes requires 2 hours in the oven and 3 hours in the decorating room. Each batch of cookies needs 1 ½ hours in the oven and ⅔ of an hour in the decorating room. The oven is available no more than 15 hours, while the decorating room can be used no more than 13 hours. A batch of cookies makes a profit of $20, and a batch of cakes makes a profit of $30. How many batches of each should be made to maximize profit?

$x =$ *# of batches of cakes*

$y =$ *# of batches of cookies*

Oven constraint	
Decorating room constraint	
Nonnegative constraint	

6. An oil company needs at least 9,000, 12,000, and 26,000 barrels of high grade, medium grade, and low grade oil, respectively. It owns two oil refineries, A and B. Refinery A produces 100, 300, and 400 barrels of oil, respectively per day. Refinery B produces 200, 100, and 300 barrels of oil, respectively per day. Find the number of days that each refinery should run in order to meet the requirements and minimize costs if refinery A costs $30,000 per day to operate and refinery B costs $20,000 per day to operate.

$$x = \#\ of\ days\ for\ refinery\ A$$
$$y = \#\ of\ days\ for\ refinery\ B$$

High grade constraint	
Medium grade constraint	
Low grade constraint	
Nonnegative constraint	

7. In solving a standard maximization problem using Simplex, you are given the following initial tableau:

$$\left[\begin{array}{cccccc|c} 4 & 2 & 3 & 1 & 0 & 0 & 9 \\ 5 & 4 & 1 & 0 & 1 & 0 & 10 \\ \hline -6 & -7 & -5 & 0 & 0 & 1 & 0 \end{array}\right]$$

a) What is the problem being solved?

b) After several steps of Simplex, the following tableau results. What is the solution?

$$\left[\begin{array}{cccccc|c} 3 & 0 & 1 & 2 & -1 & 0 & 8 \\ 11 & 1 & 0 & -1 & 3 & 0 & 21 \\ \hline 47 & 0 & 0 & 13 & 11 & 1 & 227 \end{array}\right]$$