

## Homework 3 of Math 3210

Due Date: Oct. 30th, before 18:00. Please put your homework in the assignment box before the due time. The box is on the 2nd floor of Lady Shaw Building opposite to Rm 221. The solution to the homework problems will be uploaded to the course homepage right after the due time. Because of this, any late homework submission will not be accepted.

1. Solve the following LPP by first computing the extreme points of the feasible set and then determine the optimal point by checking all extreme points. Maximize  $z = 2x + 3y$  subject to

$$\begin{cases} x + 3y & \leq 9, \\ 2x + 3y & \leq 12, \\ x, y & \geq 0. \end{cases}$$

2. Maximize  $z = 120x + 100y$  subject to

$$\begin{cases} x + y & \leq 4, \\ 5x + 3y & \leq 15, \\ x, y & \geq 0. \end{cases}$$

(a) Convert the above LPP to its standard form.  
(b) Solve the LPP by moving from one basic feasible solution to another basic feasible solution, and then comparing the values of  $z$  or applying optimality conditions.

3. Using simplex method, solve the following LPP. Determine the basic matrix  $B$ , the matrix  $Y$ , and the vector  $\mathbf{z}$  for each iteration of the Simplex method.

Maximize  $z = 2x_1 + 3x_2 - x_3$  subject to

$$\begin{cases} x_1 + 2x_2 - x_3 & \leq 6, \\ x_1 - 3x_2 - 3x_3 & \leq 10, \\ x_1 + x_3 & \leq 5, \\ x_1, x_2, x_3 & \geq 0. \end{cases}$$

4. Using simplex method, solve the following LPP.

Maximize  $z = x_1 + 2x_2 + x_3 + x_4$  subject to

$$\begin{cases} 2x_1 + x_2 + 3x_3 + x_4 & \leq 8, \\ 2x_1 + 3x_2 + 4x_4 & \leq 12, \\ 3x_1 + x_2 + 2x_3 & \leq 18, \\ x_1, x_2, x_3, x_4 & \geq 0. \end{cases}$$

**5.** Using simplex method, solve the following LPP.  
Maximize  $z = 5x_1 + 2x_2 + x_3 + x_4$  subject to

$$\begin{cases} 2x_1 + x_2 + x_3 + 2x_4 & \leq 6, \\ 3x_1 + x_3 & \leq 15, \\ 5x_1 + 4x_2 + x_4 & \leq 24, \\ x_1, x_2, x_3, x_4 & \geq 0. \end{cases}$$

**6.** Using big M method, solve the following LPP.  
Maximize  $z = 4x_1 + x_2$  subject to

$$\begin{cases} 3x_1 + x_2 & = 3, \\ 4x_1 + 3x_2 & \geq 6, \\ x_1 + 2x_2 & \leq 3, \\ x_1, x_2 & \geq 0. \end{cases}$$