

**Assignment 4 – MAT 3210 (Linear Programming) on 3.1 and 3.2**

No need to hand in

1. Use simplex method to solve the following LPP:

$$\text{maximize } z = -x_1 + 2x_2$$

subject to

$$x_1 + x_2 \leq 2,$$

$$x_1 - x_2 \leq 1,$$

$$x_1, x_2 \geq 0$$

2. Use Simplex Method to solve the following LPP

$$\text{maximize } z = 2x_1 - x_2$$

subject to

$$x_1 + x_2 \leq 2$$

$$x_2 \leq 1$$

$$x_1 - x_2 \leq 1$$

$$x_1, x_2 \geq 0$$

3. Solve the following LPP:

$$\text{maximize } z = 3x_1 - x_2 + 3x_3 + 4x_4$$

$$\text{subject to } x_1 + 2x_2 + 2x_3 + 4x_4 \leq 40$$

$$2x_1 - x_2 + x_3 + 2x_4 \leq 8$$

$$4x_1 - 2x_2 + x_3 - x_4 \leq 10$$

$$x_1, x_2, x_3, x_4 \geq 0$$

4. The following tableau represents a specific simplex iteration.

Basic	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	$x_6$	$x_7$	$x_8$	solution
$x_8$	0	3	0	-2	-3	-1	5	1	12
$x_3$	0	2	1	3	1	0	3	0	6
$x_1$	1	-1	0	0	6	-4	0	0	0
$z$	0	-5	0	4	-1	-10	0	0	620

- (a) Determine the leaving variable if the entering variable is (1)  $x_2$ , (2)  $x_4$ , (3)  $x_5$ , (4)  $x_6$ , (5)  $x_7$ .
- (b) For each of the case in part (a), determining the resulting increase or decrease in  $z$ .

5. Solve the following LPP by simplex method

$$\text{minimize } x_2 - 3x_3 + 2x_5$$

subject to

$$x_1 + 3x_2 - x_3 + 2x_5 = 7$$

$$-2x_2 + 4x_3 + x_4 = 12$$

$$-4x_2 + 3x_3 + 8x_5 + x_6 = 10$$

$$x_1, x_2, x_3, x_4, x_5, x_6 \geq 0$$

Suppose that initially we use  $x_1, x_4, x_6$  as basic variables.

6. Solve the following LPP in standard form

$$\text{maximize } 45x_1 + 80x_2$$

subject to

$$5x_1 + 20x_2 + x_3 = 400$$

$$5x_1 - 5x_2 + x_4 - x_3 = 50$$

$$x_1, x_2, x_3, x_4 \geq 0$$

- (a) assume that  $x_3, x_4$  are basic variables.
- (b) how about using  $x_1, x_2$  as basic variables?