<u>Assignment 9</u>

(5 questions

$\times 2 = 10$ marks)

1. Use Cramer's rule to solve for x, y, z & w.

$$4x + y + z + w = 6$$
$$3x + 7y - z + w = 1$$
$$7x + 3y - 5z + 8w = -3$$
$$x + y + z + 2w = 3$$

2. Solve the following by Gauss-Jordan elimination.

$$x_1 + x_2 + 2x_3 = 8$$
$$-x_1 - 2x_2 + 3x_3 = 1$$
$$3x_1 - 7x_2 + 4x_3 = 10$$

3. Solve the following by Gauss-Jordan elimination.

$$3x_1 + 2x_2 - x_3 = -15$$
$$5x_1 + 3x_2 + 2x_3 = 0$$
$$3x_1 + x_2 + 3x_3 = 11$$
$$-6x_1 + 4x_2 + 2x_3 = 30$$

4. Without using pencil & paper (i.e. think!), determine which of the following homogeneous systems have nontrivial solutions.

a) $$2x_1 - 3x_2 + 4x_3 - x_4 = 0$$
$$7x_1 + x_2 - 8x_3 + 9x_4 = 0$$
$$2x_1 + 8x_2 + x_3 - x_4 = 0$$

b) $$x_1 + 3x_2 - x_3 = 0$$
$$x_2 - 8x_3 = 0$$
$$4x_3 = 0$$

c) $a_{11} x_1 + a_{12} x_2 + a_{13} x_3 = 0$

$a_{21} x_1 + a_{22} x_2 + a_{23} x_3 = 0$

d) $3x_1 - 2x_2 = 0$

$6x_1 - 4x_2 = 0$

5. Solve the following:

$x_1 + 3x_2 + x_4 = 0$

$x_1 + 4x_2 + 2x_3 = 0$

$-2x_2 - 2x_3 - x_4 = 0$

$2x_1 - 4x_2 + x_3 + x_4 = 0$

$x_1 - 2x_2 - x_3 + x_4 = 0$