Jaypee Institute of Information and Technology
Department of Mathematics

Course: Matrix Computations (16B1NMA533)

Tutorial Sheet 3 [C301-3.2]

(Topics covered: Existence and uniqueness of solution for system of linear equations, Gauss elimination method, LU decomposition**)**

1. For what value of ***a*** and ***b*** following system of linear equations

$$x + y + z = 6$$
$$x + 2y + 3z = 10$$
$$x + 2y + az = b$$

has

i. No solution
ii. A unique solution
iii. Infinite number of solutions

Sol. i. $a - 3 = 0,\ b - 10 \neq 0.$ ii. $a - 3 \neq 0,\ b - 10 \neq 0.$ iii. $a - 3 = 0,\ b - 10 = 0.$

2. Show that the system of equations

$$3x + 4y + 5z = a$$
$$4x + 5y + 6z = b$$
$$5x + 6y + 7z = c$$

do not have a solution unless a+c=2b.

3. Solve of the following system of linear equations using Gauss elimination method

$$2x + y + z = 6$$
$$x + 3y + z = 6$$
$$3x + 4y + 2z = 12$$

Sol. $x = 2y + \frac{3}{2};\ y = y;\ z = 3 - 5y.$

4. Using Gauss elimination method with partial pivoting solve the following system of linear equations

$$2x + y + z = 10$$
$$x + 3y + z = 14$$
$$3x + y + 5z = 24$$

Sol. $x = 2; y = 3;\ z = 3.$

5. Using Doolittle's and Crout's method solve the following system of linear equations

$$x + y + 6z = 9$$
$$x + 3y + z = 6$$
$$2x + y + 5z = 10$$

Sol. $x = 2; y = 1;\ z = 1.$