Jaypee Institute of Information and Technology
Department of Mathematics

Course: Matrix Computations (16B1NMA533)

Tutorial Sheet 4 [C301-3.2]

(**Topics covered:** LU decomposition by elementary matrices, Cholesky method, Gauss Seidel method, and Gauss Jacobi method)

1. Decompose A into L and U using elementary matrices method

$$A = \begin{bmatrix} 2 & 3 & 2 \\ 1 & 3 & 2 \\ 3 & 4 & 1 \end{bmatrix}$$

2. Convert the following system of linear equations into matrix form and decompose A into L and U using elementary matrices method, hence obtain the value of x, y, and z

$$2x + y + z = 5$$
$$3x + 5y + 2z = 15$$
$$2x + y + 4z = 8$$

Solution. $x = 1, \ y = 2, \ z = 1$.

3. Using Cholesky's method solve the following system of linear equations

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

Solution. $x = 2, \ y = 1, \ z = 1$.

4. Perform **four** iterations of Jacobi's iterative method to solve the following system of linear equations $(P_0 = (x_0, y_0, z_0) = (0, \ 0, \ 0))$

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

Solution. Exact Answer: $x = 1, \ y = -1, \ z = 1$.

5. Perform **Three** iterations of Gauss Seidel method to solve the following system of linear equations $(P_0 = (x_0, y_0, z_0) = (0, \ 0, \ 0))$

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

Solution. Exact Answer: $x = 1, \ y = -1, \ z = 1$.