

Tutorial Worksheet-3 (WL3.2, WL4.1)

Direct computational method: Gauss elimination method, inspection of consistency of system of equations, Define vector norm and its properties, types of norms, define matrix norm, properties of matrix norms, spectral radius of matrix, Matrix decomposition, Iterative schemes to solve system of linear equations: Jacobi iterative method

Name and section: _____

Instructor's name: _____

1. Find the basis of column space and null space of below matrices.

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

2. Use Gauss-elimination and Gauss-Jordan-elimination to solve below linear system of equation(s).

$$\begin{aligned} 3x_1 + 5x_2 + 3x_3 &= 25 \\ 7x_1 + 9x_2 + 19x_3 &= 65 \\ -4x_1 + 5x_2 + 11x_3 &= 5 \end{aligned}$$

3. Find the matrix norms $\|\cdot\|_\infty$ and $\|\cdot\|_1$ of the matrix $\begin{bmatrix} 1 & 0 & 1 \\ 2 & 2 & 0 \\ 0 & 1 & 0 \end{bmatrix}$

4. Solve the system of linear equation by Jacobi Method and Gauss Seidel Method up to 2th iteration with initial approximation as $x^{(0)} = 0, y^{(0)} = 0, z^{(0)} = 0$

$$\begin{aligned} 5x - y + z &= 10 \\ 2x + 4y &= 12 \\ x + y + 5z &= -1 \end{aligned}$$