Department of Mathematics, IIT Madras
MA5470 NUMERICAL ANALYSIS

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1. If **Gauss** elimination procedure with **scaled row** pivoting is used on the system $Ax = b$ with

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 5 \\ 4 & 1 & 6 \end{pmatrix}$$

then what is the **second** pivot row. (5)

2. Find the operational count of the Gauss elimination procedure with scaled row pivoting. (5)

3. Find the $(2,3)$ element of the **Cholesky's** decomposition of the matrix (5)

$$C = \begin{pmatrix} 26 & 12 & 42 \\ 12 & 9 & 22 \\ 42 & 22 & 70 \end{pmatrix}$$

4. Consider the linear system

$$\begin{pmatrix} 1 & 2 & 6 \\ 9 & 6 & 1 \\ 3 & 7 & 2 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 9 \\ 16 \\ 12 \end{pmatrix}$$

Rewrite the above system in **diagonally dominant** form and then perform the **Jacobi** iterative procedure, with initial approximation $(.5, .5, .5)^T$, to compute $x_1^{[3]}$. (5)

$LUx = b$

$(LU)^T x = b$

$U^T L^T x = b$

$l_{23} = a_{23} - l_{21}$

$l_{ij} = a_{ij} - \sum_{k=1}^{j-1} l_{ik} l_{jk}$, $i = 2$, $n+j <$, l_{jj} , $j + j \le n$

$a_{23} - l_{21} l_{21} - l_1$

$\begin{bmatrix} 0\ 0 \cdots & & a_{1n} \\ 0 \cdots & & \end{bmatrix}$ $j \le n-1$, $2+j \le n$, j