Assignment 2. LU decomposition   Marks 10

Posted on 21.08.2025 @ 2:30 pm and due on 21.08.2025 @ 6:00 pm

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1. Find LU decomposition of the matrix and verify. The LU decomposition routine must be kept in the library for later use. Mention your choice of *Doolittle* or *Crout* clearly.   **[5]**

$$\mathbf{A} = \begin{pmatrix} 1 & 2 & 4 \\ 3 & 8 & 14 \\ 2 & 6 & 13 \end{pmatrix}$$

2. Given below is a system of linear equations. Use LU decomposition to solve it by forward-backward substitution. Use either *Doolittle* or *Crout*.   **[5]**

$$
\begin{aligned}
19 &= a_1 - a_2 + 4a_3 + 2a_5 + 9a_6 \\
2 &= 5a_2 - 2a_3 + 7a_4 + 8a_5 + 4a_6 \\
13 &= a_1 + 5a_3 + 7a_4 + 3a_5 - 2a_6 \\
-7 &= 6a_1 - a_2 + 2a_3 + 3a_4 + 8a_6 \\
-9 &= -4a_1 + 2a_2 + 5a_4 - 5a_5 + 3a_6 \\
2 &= 7a_2 - a_3 + 5a_4 + 4a_5 - 2a_6
\end{aligned}
$$