Cholesky

Eseguire la fattorizzazione di:

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

ed eseguire la sol. del sistema lineare:

$$Ax = b$$

con $b = \begin{pmatrix} 2 \\ 1 \\ 6 \end{pmatrix}$

Soluzione: $L = \begin{pmatrix} 1 & 0 & 0 \\ -1 & \sqrt{2} & 0 \\ 2 & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \end{pmatrix}$

$Ly = b$ $\quad \begin{pmatrix} 1 & 0 & 0 \\ -1 & \sqrt{2} & 0 \\ 2 & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \\ 6 \end{pmatrix}$ $\quad y = \begin{pmatrix} 1 \\ \sqrt{2} \\ 3\sqrt{2} \end{pmatrix}$

$L^T x = y$ $\quad \begin{pmatrix} 1 & -1 & 2 \\ 0 & \sqrt{2} & \frac{\sqrt{2}}{2} \\ 0 & 0 & \frac{\sqrt{2}}{2} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 1 \\ \frac{3\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} \end{pmatrix}$ $\quad x = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$