

Numara:

İsim-Soyisim:

SORULAR

1. Newton-Raphson yöntemi ve kiriş yönteminin iteratif formüllerini yazınız.

$$x_1 - x_2 + 2x_3 = 2$$

2. $x_1 + 2x_2 - 2x_3 = 1$ denklem sistemini LU yöntemi ile çözünüz.

$$2x_1 - x_2 + 2x_3 = 3$$

CEVAPLAR

$$1) \text{ Newton-Raphson: } P_k = g(P_{k-1}) = P_{k-1} - \frac{f(P_{k-1})}{f'(P_{k-1})}, \quad k \geq 1$$

$$\text{Kiriş: } x_{n+1} = x_n - f(x_n) \cdot \frac{x_n - x_{n-1}}{f(x_n) - f(x_{n-1})}, \quad n \geq 1$$

$$2) \quad AX=B \rightarrow LUX=B \rightarrow UX=y \rightarrow Ly=B$$

$$A=LU \rightarrow \underbrace{\begin{bmatrix} 1 & -1 & 2 \\ 1 & 2 & -2 \\ 2 & -1 & 2 \end{bmatrix}}_A = \underbrace{\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 2 & \frac{1}{3} & 1 \end{bmatrix}}_L \underbrace{\begin{bmatrix} 1 & -1 & 2 \\ 0 & 3 & -4 \\ 0 & 0 & -\frac{2}{3} \end{bmatrix}}_U$$

$$Ly=B \rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 2 & \frac{1}{3} & 1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix} \rightarrow \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ -\frac{2}{3} \end{bmatrix}$$

$$UX=y \rightarrow \begin{bmatrix} 1 & -1 & 2 \\ 0 & 3 & -4 \\ 0 & 0 & -\frac{2}{3} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ -\frac{2}{3} \end{bmatrix} \rightarrow \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$