

CE - LU Factorization

$$A = \begin{bmatrix} 1 & 0 & 1/3 & 0 \\ 0 & 1 & 3 & -1 \\ 3 & -3 & 0 & 6 \\ 0 & 2 & 4 & -6 \end{bmatrix}$$

$$A^{(1)} = A$$

$$M_1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -3 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A^{(2)} = M_1 A^{(1)} = \begin{bmatrix} 1 & 0 & 1/3 & 0 \\ 0 & 1 & 3 & -1 \\ 0 & -3 & -1 & 6 \\ 0 & 2 & 4 & -6 \end{bmatrix}$$

$$M_2 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 3 & 1 & 0 \\ 0 & -2 & 0 & 1 \end{bmatrix}$$

$$A^{(3)} = M_2 A^{(2)} = \begin{bmatrix} 1 & 0 & 1/3 & 0 \\ 0 & 1 & 3 & -1 \\ 0 & 0 & 8 & 3 \\ 0 & 0 & -2 & -4 \end{bmatrix}$$

$$M_3 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1/4 & 1 \end{bmatrix}$$

$$A^{(4)} = M_3 A^{(3)} = \begin{bmatrix} 1 & 0 & 1/3 & 0 \\ 0 & 1 & 3 & -1 \\ 0 & 0 & 8 & 3 \\ 0 & 0 & 0 & -13/4 \end{bmatrix}$$

$$L = M^{-1} = M_1^{-1} M_2^{-1} M_3^{-1} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 3 & -3 & 1 & 0 \\ 0 & 2 & -1/4 & 1 \end{bmatrix}, U = A^{(4)} = \begin{bmatrix} 1 & 0 & 1/3 & 0 \\ 0 & 1 & 3 & -1 \\ 0 & 0 & 8 & 3 \\ 0 & 0 & 0 & -13/4 \end{bmatrix}$$