1. create the 3 M matrices (M_1, M_2, M_3) as well as the L and U matrices for the following A Matrix.

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

* 1st row pivot
Multipliers: $\frac{0}{1}, \frac{3}{1}, \frac{0}{1}$
$[0, 3, 0]$

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

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* 2nd row pivot
Multipliers: $-\frac{3}{1}, \frac{2}{1}$
$[-3, 2]$

$$A = \begin{bmatrix} 1 & 0 & 1/3 & 0 \\ 0 & 1 & 3 & -1 \\ 0 & 0 & 10 & 3 \\ 0 & 0 & -2 & -4 \end{bmatrix} \qquad M_2 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 3 & 1 & 0 \\ 0 & -2 & 0 & 1 \end{bmatrix}$$

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* 3rd row pivot
Mutiplier: $\frac{-2}{10}$
$[-1/5]$

$$A = \begin{bmatrix} 1 & 0 & 1/3 & 0 \\ 0 & 1 & 3 & -1 \\ 0 & 0 & 10 & 3 \\ 0 & 0 & 0 & -\frac{12}{5} \end{bmatrix} \qquad M_3 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & \frac{1}{5} & 1 \end{bmatrix}$$

$$L = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -3 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 3 & 1 & 0 \\ 0 & -2 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & \frac{1}{5} & 1 \end{bmatrix}$$

$$\Downarrow$$

$$L = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -3 & 3 & 1 & 0 \\ 0 & -2 & \frac{1}{5} & 1 \end{bmatrix} \qquad\qquad U = \begin{bmatrix} 1 & 0 & \frac{1}{3} & 0 \\ 0 & 1 & 3 & -1 \\ 0 & 0 & 10 & 3 \\ 0 & 0 & 0 & -\frac{17}{5} \end{bmatrix}$$