

$$= \begin{pmatrix} 1 & 0 & 0 \\ \frac{3}{2} & 1 & 0 \\ \frac{1}{2} & \frac{11}{13} & 1 \end{pmatrix} U = \begin{pmatrix} 2 & -3 & -1 \\ 0 & \frac{13}{2} & -\frac{1}{2} \\ 0 & 0 & \frac{32}{13} \end{pmatrix} b = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$$

~~A = LU~~

$$LUx = b$$

$$Ly = b$$

$$\begin{pmatrix} 1 & 0 & 0 \\ \frac{3}{2} & 1 & 0 \\ \frac{1}{2} & \frac{11}{13} & 1 \end{pmatrix} \cdot \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$$

$$y_1 = 1$$

$$\frac{3}{2}y_1 + y_2 = -1 \Rightarrow y_2 = -2\frac{1}{2}$$

$$\frac{1}{2}y_1 + \frac{11}{13}y_2 + y_3 = 2 \rightarrow y_3 = 2 - \frac{1}{2} - \frac{11}{13} \cdot \left(-\frac{5}{2}\right)$$

$$y_3 = \frac{3}{2} + \frac{55}{26} = \frac{94}{26} = 3\frac{8}{13}$$

$$y_1 = 1$$

$$y_2 = -2\frac{1}{2}$$

$$y_3 = 3\frac{8}{13}$$

$$U \cdot x = y$$

$$\begin{pmatrix} 2 & -3 & -1 \\ 0 & \frac{13}{2} & -\frac{1}{2} \\ 0 & 0 & \frac{32}{13} \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 1 \\ -2\frac{1}{2} \\ 3\frac{8}{13} \end{pmatrix}$$

$$\frac{32}{13}x_3 = 3\frac{8}{13}$$

$$x_3 = \frac{44}{13} \cdot \frac{13}{32} = \frac{44}{32}$$

$$\frac{13}{2}x_2 - \frac{1}{2}x_3 = -2\frac{1}{2}$$

$$\frac{13}{2}x_2 = -\frac{5}{2} + \frac{1}{2} \cdot \frac{44}{32}$$

$$\frac{13}{2}x_2 = -\frac{5}{2} + \frac{328}{64}$$

$$\frac{13}{2}x_2 = -\frac{160}{64} + \frac{328}{64}$$

$$x_2 = \frac{168}{32} \cdot \frac{2}{13} = \frac{13}{32}$$

$$2x_1 - 3 \cdot \frac{13}{32} - \frac{44}{32} = 1$$

$$2x_1 = \frac{39}{32} + \frac{44}{32} + 1$$

$$2x_1 = \frac{86}{32} + \frac{32}{32}$$

$$2x_1 = \frac{118}{32} \cdot \frac{1}{2}$$

$$x_1 = \frac{59}{32}$$

$$x_1 = \frac{59}{32}$$

$$x_2 = \frac{13}{32}$$

$$x_3 = \frac{44}{32}$$