1)

$$\underbrace{\begin{bmatrix} 1 & 4 & 5 \\ 2 & 2 & 5 \\ -4 & 1 & 3 \end{bmatrix}}_{A} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \underbrace{\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}}_{B}$$

scale = [5, 5, 4]

index = [1, 2, 3]

Forward elimination part

Step 1.

Ratios = $\left\{ \frac{|1|}{5}, \frac{|2|}{5}, \frac{|-4|}{4} \right\}$ max one is l_3

swap (l_1, l_3)

index = [3, 2, 1]

pivot = 3

Let's update A and B.

factor1 = 2/-4 = -0,5

factor2 = 1/-4 = -0,25

$$\begin{bmatrix} 0 & 4,5 & 5,75 \\ 0 & 2,5 & 4,5 \\ -4 & 1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1,75 \\ 3,5 \\ 3 \end{bmatrix}$$

tep 2:

Ratios = $\left\{ \frac{|4,20|}{5} ; \frac{|2,5|}{5} \right\}$ max one is l_1,

swap (l_2, l_4)

index = $[3, 2, 2]$

pivot = 1.

let's update A and B.

factor 1 = 2,5 / 1,25 = 0,588

$$\begin{bmatrix} 0 & 4,25 & 5,75 \\ 0 & 0 & 3,117 \\ -4 & 1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1,75 \\ 2,47 \\ 3 \end{bmatrix}$$

Backward substitution part

Step 1:

$3,117 x_3 = 2,47$

$x_3 = 0,792$

$4,25 x_2 = 1,75 - 5,75 \cdot x_3 =$

$= -2,765$

$x_2 = -0,66$

$$-4x_2 = 3 - 3x_3 - x_2 = 1,277$$

$$x_1 = -0,32$$

$$\text{Result list} = \begin{bmatrix} -0,32 \\ -0,66 \\ 0,79 \end{bmatrix}$$