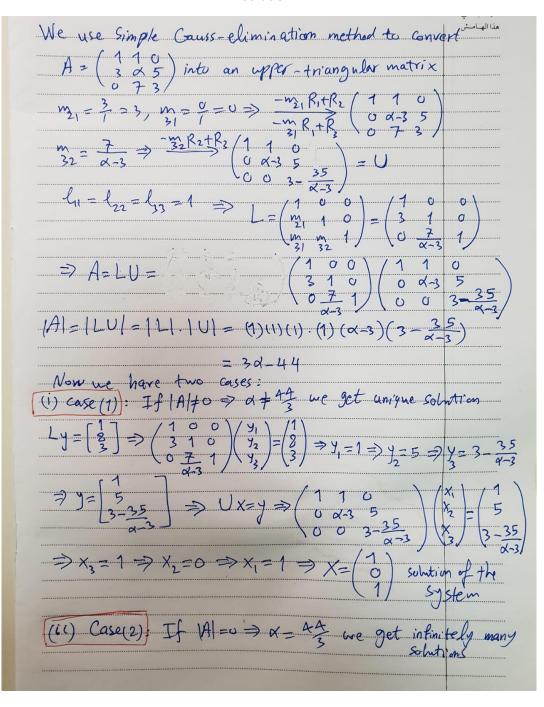
Use LU-factorization method with Doolittle's method ( $l_{ii}=1$ ) to find the solution of the consistent system for  $\alpha \neq 3$ .

## **Solution:**



So |A| = 0, gives,  $\alpha = 44/3$  and for this value of  $\alpha$  we have non-trivial solutions. By solving the lower-triangular system of the form  $L\mathbf{y} = [1, 8, 3]^T$  of the form

$$L\mathbf{y} = \begin{pmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 0 & 3/5 & 1 \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 8 \\ 3 \end{pmatrix} = \mathbf{b},$$

we obtained the solution  $\mathbf{y} = [1, 5, 0]^T$ . Now solving the upper-triangular system  $U\mathbf{x} = \mathbf{y}$  of the form

$$U\mathbf{x} = \begin{pmatrix} 1 & 1 & 0 \\ 0 & 35/3 & 5 \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 5 \\ 0 \end{pmatrix} = \mathbf{y}.$$

If we choose  $x_3 = t \in R$ ,  $t \neq 0$ , then,  $x_2 = 3(1-t)/7$  and  $x_1 = (4+3t)/7$ , then the non-trivial solutions of the given system is  $\mathbf{x}^* = [(4+3t)/7, 3(1-t)/7, t]^T$ .