Pivoting

$$\begin{bmatrix} \boxed{0} & 3 & 0 \\ 2 & \boxed{0} & 0 \\ 0 & 0 & \boxed{1} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$$

This are the pivot points (Pivot points can't be ~~Zero~~)

If we try to solve this linear system using Gaussian Elimination / LU Decomposition, there will be an issue.

When we try to find the row multiplier for R2,

$$m_{21} = \frac{a_{21}}{a_{11}} = \frac{2}{0} = \text{undefined}.$$

We can't have undefined value for row multipliers.

To solve this issue, we need to apply pivoting.

We can either swap the rows or the columns.

The pivot points can't be zero.

For our given example, we can swap the rows (R_1 & R_2

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$$

→ this constant value also been swapped

→ if you want you also swapped this. like x_2 then x_1 then x_3.

However, if you want to swap the columns you have to just swap in the coefficient matrix. You don't need to swap the constant values of x values.

Now, we can apply Gaussian Elimination/ LU Decomposition.