Pivoting

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

a_{11} → $\boxed{0}$ 3 0

a_{21} → 2 $\boxed{0}$ 0

0 0 $\boxed{1}$

pivot points

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 R_2,

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

We cannot have undefined value for row multipliers. In order to solve this issue, we need to apply Pivoting. We can either swap the rows / columns.

** The pivot points cannot be zero.

For our given example, we can swap the rows (R1 & R2)

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

→ The constant values has also been swapped.

Now, we can apply Gaussian Elimination / LU Decomposition