

Inverse the matrix $\begin{pmatrix} 2 & 0 & 1 \\ 3 & 2 & -5 \\ 1 & -1 & 0 \end{pmatrix}$ by Gauss Jordan method.

Solution:

$$\left(\begin{array}{ccc|ccc} 2 & 0 & 1 & 1 & 0 & 0 \\ 3 & 2 & -5 & 0 & 1 & 0 \\ 1 & -1 & 0 & 0 & 0 & 1 \end{array} \right) \text{Exchange row 1 and row 3.}$$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & 0 & 0 & 0 & 1 \\ 3 & 2 & -5 & 0 & 1 & 0 \\ 2 & 0 & 1 & 1 & 0 & 0 \end{array} \right) \sim \left(\begin{array}{ccc|ccc} 1 & -1 & 0 & 0 & 0 & 1 \\ 0 & 5 & -5 & 0 & 1 & -3 \\ 0 & 2 & 1 & 1 & 0 & -2 \end{array} \right) \sim \left(\begin{array}{ccc|ccc} 1 & -1 & 0 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 & \frac{1}{5} & -\frac{3}{5} \\ 0 & 2 & 1 & 1 & 0 & -2 \end{array} \right) \sim$$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & 0 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 & \frac{1}{5} & -\frac{3}{5} \\ 0 & 0 & 3 & 1 & -\frac{2}{5} & -\frac{4}{5} \end{array} \right) \sim \left(\begin{array}{ccc|ccc} 1 & -1 & 0 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 & \frac{1}{5} & -\frac{3}{5} \\ 0 & 0 & 1 & \frac{1}{3} & -\frac{2}{15} & -\frac{4}{15} \end{array} \right) \sim$$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & \frac{1}{3} & \frac{1}{15} & -\frac{13}{15} \\ 0 & 0 & 1 & \frac{1}{3} & -\frac{2}{15} & -\frac{4}{15} \end{array} \right) \sim \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{1}{3} & \frac{1}{15} & \frac{2}{15} \\ 0 & 1 & 0 & \frac{1}{3} & \frac{1}{15} & -\frac{13}{15} \\ 0 & 0 & 1 & \frac{1}{3} & -\frac{2}{15} & -\frac{4}{15} \end{array} \right)$$

So inverse matrix is $\begin{pmatrix} \frac{1}{3} & \frac{1}{15} & \frac{2}{15} \\ \frac{1}{3} & \frac{1}{15} & -\frac{13}{15} \\ \frac{1}{3} & -\frac{2}{15} & -\frac{4}{15} \end{pmatrix}$

Answer: $\begin{pmatrix} \frac{1}{3} & \frac{1}{15} & \frac{2}{15} \\ \frac{1}{3} & \frac{1}{15} & -\frac{13}{15} \\ \frac{1}{3} & -\frac{2}{15} & -\frac{4}{15} \end{pmatrix}$.