

## Question #65686, Math / Other

Find the inverse of the matrix  $\{(3, 1, 2), (-2, 3, -5), (1, 2, 4)\}$  using Gauss Jordan Method

**Answer.**

$$A = \begin{pmatrix} 3 & 1 & 2 \\ -2 & 3 & -5 \\ 1 & 2 & 4 \end{pmatrix}$$

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

$$\left( \begin{array}{ccc|ccc} 1 & \frac{1}{3} & \frac{2}{3} & \frac{1}{3} & 0 & 0 \\ 0 & \frac{11}{3} & -\frac{11}{3} & \frac{2}{3} & 1 & 0 \\ 1 & 2 & 4 & 0 & 0 & 1 \end{array} \right) \rightarrow \left( \begin{array}{ccc|ccc} 1 & \frac{1}{3} & \frac{2}{3} & \frac{1}{3} & 0 & 0 \\ 0 & \frac{11}{3} & -\frac{11}{3} & \frac{2}{3} & 1 & 0 \\ 0 & \frac{5}{3} & -\frac{10}{3} & -\frac{1}{3} & 0 & 1 \end{array} \right) \rightarrow$$

$$\left( \begin{array}{ccc|ccc} 1 & \frac{1}{3} & \frac{2}{3} & \frac{1}{3} & 0 & 0 \\ 0 & 1 & -1 & \frac{2}{11} & \frac{3}{11} & 0 \\ 0 & \frac{5}{3} & -\frac{10}{3} & -\frac{1}{3} & 0 & 1 \end{array} \right) \rightarrow \left( \begin{array}{ccc|ccc} 1 & \frac{1}{3} & \frac{2}{3} & \frac{1}{3} & 0 & 0 \\ 0 & 1 & -1 & \frac{3}{55} & \frac{2}{11} & \frac{1}{5} \\ 0 & 0 & 5 & -\frac{7}{11} & -\frac{5}{11} & 1 \end{array} \right) \rightarrow$$

$$\left( \begin{array}{ccc|ccc} 1 & \frac{1}{3} & 0 & \frac{23}{55} & \frac{2}{33} & -\frac{2}{15} \\ 0 & 1 & 0 & \frac{3}{55} & \frac{2}{11} & \frac{1}{5} \\ 0 & 0 & 5 & -\frac{7}{11} & -\frac{5}{11} & 1 \end{array} \right) \rightarrow \left( \begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{2}{3} & 0 & -\frac{1}{5} \\ 0 & 1 & 0 & \frac{3}{55} & \frac{2}{11} & \frac{1}{5} \\ 0 & 0 & 1 & -\frac{7}{55} & -\frac{1}{11} & \frac{1}{5} \end{array} \right)$$

$$\text{So } A^{-1} = \begin{pmatrix} \frac{2}{3} & 0 & -\frac{1}{5} \\ \frac{3}{55} & \frac{2}{11} & \frac{1}{5} \\ -\frac{7}{55} & -\frac{1}{11} & \frac{1}{5} \end{pmatrix}.$$

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