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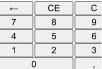


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# Gaussian elimination calculator







Werkstudent (m/w/d) im Bereich KI-Entwickl.. This online calculator will help you to solve a system of linear equations using Gauss-Jordan elimination.

Using this online calculator, you will receive a detailed step-by-step solution to your problem, which will help you understand the algorithm how to solve system of linear equations by Gauss-Jordan elimination.

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## Calculator Guide

## Linear equations solver: Solving by Gaussian Elimination.

The number of equations in the system:  $3 \checkmark$ 

Change the names of the variables in the system

Fill the system of linear equations:

Solve the system

You can input only integer numbers, decimals or fractions in this online calculator (-2.4, 5/7, ...). More in-depth information read at these rules

## Solution:

$$x_1 + x_2 - x_3 = -2$$

$$2x_1 - x_2 + x_3 = 5$$

$$-x_1 + 2x_2 + 2x_3 = 1$$

Rewrite the system in matrix form and solve it by Gaussian Elimination (Gauss-Jordan elimination)

$$\left(\begin{array}{ccc|c}
1 & 1 & -1 & -2 \\
2 & -1 & 1 & 5 \\
-1 & 2 & 2 & 1
\end{array}\right)$$

 $R_2$  - 2  $R_1 \rightarrow R_2$  (multiply 1 row by 2 and subtract it from 2 row);  $R_3 + 1$   $R_1 \rightarrow R_3$  (multiply 1 row by 1 and add it to 3 row)

$$\left(\begin{array}{ccc|c}
1 & 1 & -1 & -2 \\
0 & -3 & 3 & 9 \\
0 & 3 & 1 & -1
\end{array}\right)$$

 $R_2/-3 \rightarrow R_2$  (divide the 2 row by -3)

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

 $R_1$  - 1  $R_2 \rightarrow R_1$  (multiply 2 row by 1 and subtract it from 1 row);  $R_3$  - 3  $R_2 \rightarrow R_3$  (multiply 2 row by 3 and subtract it from 3 row)

$$\left(\begin{array}{ccc|c}
1 & 0 & 0 & 1 \\
0 & 1 & -1 & -3 \\
0 & 0 & 4 & 8
\end{array}\right)$$

 $R_3 / 4 \rightarrow R_3$  (divide the 3 row by 4)

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

 $R_2 + 1$   $R_3 \rightarrow R_2$  (multiply 3 row by 1 and add it to 2 row)

$$\left(\begin{array}{ccc|c}
1 & 0 & 0 & 1 \\
0 & 1 & 0 & -1 \\
0 & 0 & 1 & 2
\end{array}\right)$$

$$x_1 = 1$$

$$x_2 = -1$$

$$x_3 = 2$$

#### Make a check:

$$1 + (-1) - 2 = 1 - 1 - 2 = -2$$

$$2 \cdot 1 - (-1) + 2 = 2 + 1 + 2 = 5$$
  
-1 + 2 \cdot (-1) + 2 \cdot 2 = -1 - 2 + 4 = 1

Check completed successfully.

#### Answer:

$$x_1 = 1$$

$$x_2 = -1$$

$$x_3 = 2$$

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