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Practical: Gauss Jordon Method

In[6]:=
```
(*Define the augmented matrix*)
augmentedMatrix = {{1, 1, 1, 6}, {2, -1, 3, 7}, {3, 2, -1, 8}};
Print["Original augmented matrix:"];
MatrixForm[augmentedMatrix]

(*Apply Gauss-Jordan elimination*)
n = Length[augmentedMatrix];
(*Number of rows*)m = Length[augmentedMatrix[[1]]];
(*Number of columns*)(*Forward elimination*)
Do[(*Divide the pivot row by the pivot element*)
 pivot = augmentedMatrix[[i, i]];
 augmentedMatrix[[i]] /= pivot;
 (*Eliminate elements below the pivot*)
 Do[augmentedMatrix[[j]] -= augmentedMatrix[[j, i]] * augmentedMatrix[[i]],
  {j, i + 1, n}], {i, 1, n}]
(*Backward elimination*)
Do[(*Eliminate elements above the pivot*)
 Do[augmentedMatrix[[j]] -= augmentedMatrix[[j, i]] * augmentedMatrix[[i]],
  {j, i - 1, 1, -1}], {i, n, 2, -1}]
(*Display the reduced row-echelon form*)
Print["Reduced row-echelon form:"];
MatrixForm[augmentedMatrix]
(*Extract the solution*)
solution = augmentedMatrix[[All, -1]];
(*Display the solution*)
Print["Solution:"];
solution // ColumnForm
```

Original augmented matrix:

Out[8]//MatrixForm=

$$\begin{pmatrix} 1 & 1 & 1 & 6 \\ 2 & -1 & 3 & 7 \\ 3 & 2 & -1 & 8 \end{pmatrix}$$

Reduced row-echelon form:

Out[14]//MatrixForm=

$$\begin{pmatrix} 1 & 0 & 0 & \frac{23}{13} \\ 0 & 1 & 0 & \frac{30}{13} \\ 0 & 0 & 1 & \frac{25}{13} \end{pmatrix}$$

Solution:

Out[17]= $\frac{23}{13}$

$\frac{30}{13}$

$\frac{25}{13}$