# Gauss Jordan

Q1 y+z=2 , 2x+3z=5 , x+y+z= 3

In[161]:=
```
a = {{0, 1, 1, 2}, {2, 0, 3, 5}, {1, 1, 1, 3}};
a // MatrixForm
```

Out[162]//MatrixForm=

$$\begin{pmatrix} 0 & 1 & 1 & 2 \\ 2 & 0 & 3 & 5 \\ 1 & 1 & 1 & 3 \end{pmatrix}$$

In[163]:=
```
RowReduce[a] // MatrixForm
```

Out[163]//MatrixForm=

$$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{pmatrix}$$

```
Solve[{x == 1, y == 1, z == 1}, {x, y, z}]
```

Out[164]=

{{x → 1, y → 1, z → 1}}

Q2 x+y+z=1 , 4x+3y-z=6 , 3x+5y+3z=4

In[165]:=
```
b = {{1, 1, 1, 1}, {4, 3, -1, 6}, {3, 5, 3, 4}};
b // MatrixForm
```

Out[166]//MatrixForm=

$$\begin{pmatrix} 1 & 1 & 1 & 1 \\ 4 & 3 & -1 & 6 \\ 3 & 5 & 3 & 4 \end{pmatrix}$$

In[177]:=
```
RowReduce[b] // MatrixForm
```

Out[177]//MatrixForm=

$$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & \frac{1}{2} \\ 0 & 0 & 1 & -\frac{1}{2} \end{pmatrix}$$

In[178]:=
```
Solve[{x == 1, y == 1 / 2, z == -1 / 2}, {x, y, z}]
```

Out[178]=

$$\left\{\left\{x \to 1,\ y \to \frac{1}{2},\ z \to -\frac{1}{2}\right\}\right\}$$

Q3: 2x+y+z-2w=-10 , 4x+2z+w=8 , 3x+2y+2z=7, x+3y+2z-w=-5

In[169]:=
```
c = {{2, 1, 1, -2, -10}, {4, 0, 2, 1, 8}, {3, 2, 2, 0, 7}, {1, 3, 2, -1, -5}};
c // MatrixForm
```

Out[170]//MatrixForm=

$$\begin{pmatrix} 2 & 1 & 1 & -2 & -10 \\ 4 & 0 & 2 & 1 & 8 \\ 3 & 2 & 2 & 0 & 7 \\ 1 & 3 & 2 & -1 & -5 \end{pmatrix}$$

In[171]:=
```
RowReduce[c] // MatrixForm
```

Out[171]//MatrixForm=

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 5 \\ 0 & 1 & 0 & 0 & 6 \\ 0 & 0 & 1 & 0 & -10 \\ 0 & 0 & 0 & 1 & 8 \end{pmatrix}$$

In[172]:=
```
Solve[{x == 5, y == 6, z == -10, w == 8}, {x, y, z, w}]
```

Out[172]=

$$\{\{x \to 5,\ y \to 6,\ z \to -10,\ w \to 8\}\}$$

Q4 3x+3y+4z=20 , 2x+y+3z =13 , x+y+3z=6

In[173]:=
```
d = {{3, 3, 4, 20}, {2, 1, 3, 13}, {1, 1, 3, 6}};
d // MatrixForm
```

Out[174]//MatrixForm=

$$\begin{pmatrix} 3 & 3 & 4 & 20 \\ 2 & 1 & 3 & 13 \\ 1 & 1 & 3 & 6 \end{pmatrix}$$

In[175]:=
```
RowReduce[d] // MatrixForm
```

Out[175]//MatrixForm=

$$\begin{pmatrix} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & \frac{1}{5} \\ 0 & 0 & 1 & -\frac{2}{5} \end{pmatrix}$$

In[176]:=
```
Solve[{x == 7, y == 1/5, z == -2/5}, {x, y, z}]
```

Out[176]=

$$\left\{\left\{x \to 7,\ y \to \frac{1}{5},\ z \to -\frac{2}{5}\right\}\right\}$$