Gauss – Jordan:

STEP 1: Get 1 in row1 Column1 by dividing row1 by the number in row1 column1

$$\left[\begin{array}{ccc|c} 1 & - & - & - \\ - & - & - & - \\ - & - & - & - \end{array}\right]$$

STEP 2: Make row2 column 1 & row3 column 1 to **0** by adding them to row 1.

$$\left[\begin{array}{ccc|c} 1 & - & - & - \\ 0 & - & - & - \\ 0 & - & - & - \end{array}\right]$$

STEP 3: Make row2 column2 to 1 by dividing row2 by the number in row2 column 2.

$$\left[\begin{array}{ccc|c} 1 & - & - & - \\ 0 & 1 & - & - \\ 0 & - & - & - \end{array}\right]$$

STEP 4: Make row1 column2 & row3 column 2 to **0** by adding them to row 2.

$$\left[\begin{array}{ccc|c} 1 & 0 & - & - \\ 0 & 1 & - & - \\ 0 & 0 & - & - \end{array}\right]$$

STEP 5: Make row3 column3 to 1 by dividing row3 by the number in row3 column3.

$$\left[\begin{array}{ccc|c} 1 & 0 & - & - \\ 0 & 1 & - & - \\ 0 & 0 & 1 & - \end{array}\right]$$

STEP 6: Make row1 column3 & row2 column3 to **0** by adding them to row3.

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & - \\ 0 & 1 & 0 & - \\ 0 & 0 & 1 & - \end{array}\right]$$

ANSWER: x = row1 y = row2 z = row3

(x, y, z)

Ex: Solve the system of equations using the Gauss-Jordan Method

$$\begin{aligned} x - y + z &= -4 \\ -2x + 3y - z &= 15 \\ 3x + 2y - z &= 5 \end{aligned}$$

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ -2 & 3 & -1 & 15 \\ 3 & 2 & -1 & 5 \end{array}\right] \quad \begin{array}{l} 2R_1+R_2 \to R_2 \\ -3R_1+R_3 \to R_3 \end{array}$$

Eliminate x in equation 2 & 3

Eq2:	Eq3:
2(x-y+z=-4)	-3(x-y+z=-4)
2x-2y+2z=-8	-3x+3y-3z=12
-2x+3y-z=15	3x+2y-z=5
0x+y+z = 7	0x+5y-4z=17

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 1 & 1 & 7 \\ 0 & 5 & -4 & 17 \end{array}\right] \quad \begin{array}{l} 1R_2+R_1 \to R_1 \\ -5R_2+R_3 \to R_2 \end{array}$$

Eliminate y in equation 1 & 3

Eq1	Eq3
	-5(y+z = 7)
x-y+z=-4	-5y-5z=-35
y+z= 7	5y-4z= 17
x+0y+2z=3	0y-9z=-18

$$\left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 1 & 1 & 7 \\ 0 & 0 & -9 & -18 \end{array}\right] \quad -\frac{1}{9}R_3 \to R_3$$

Solve for z (get 1z in equation 3)

$$\left(-\tfrac{1}{9}\right) - 9z = -18\left(-\tfrac{1}{9}\right)$$

z = 2

$$\left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 1 & 1 & 7 \\ 0 & 0 & 1 & 2 \end{array}\right] \quad \begin{array}{l} -2R_3+R_1 \to R_1 \\ -1R_3+R_2 \to R_2 \end{array}$$

Eliminate z in equation 1 & 2

Eq1	Eq2
-2(z = 2)	-1(z = 2)
x+2z = 3	y+z = 7
-2z = -4	-z = -2
x = -1	y = 5

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 2 \end{array}\right]$$

x = -1

y = 5

z = 2

(-1, 5, 2)