

Solve using Row Echelon

$$\begin{aligned} 3x + 5y &= 19 \\ 2x + 3y &= 12 \end{aligned}$$

equation form

$$\begin{bmatrix} 3 & 5 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 19 \\ 12 \end{bmatrix}$$

Matrix form

$$\begin{bmatrix} 3 & 5 & 19 \\ 2 & 3 & 12 \end{bmatrix}$$

Row Echelon form

$$\begin{array}{l} R_1 \times \frac{1}{3} \\ R_2 \end{array} \begin{bmatrix} 1 & \frac{5}{3} & \frac{19}{3} \\ 2 & 3 & 12 \end{bmatrix}$$

$$\begin{array}{l} R_1 \\ R_2 - 2R_1 \end{array} \begin{bmatrix} 1 & \frac{5}{3} & \frac{19}{3} \\ 0 & -\frac{1}{3} & -\frac{2}{3} \end{bmatrix}$$

$$\begin{array}{l} R_1 \\ -3R_2 \end{array} \begin{bmatrix} 1 & \frac{5}{3} & \frac{19}{3} \\ 0 & 1 & 2 \end{bmatrix}$$

$$\begin{array}{l} R_1 - \frac{5}{3}R_2 \\ R_2 \end{array} \begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & 2 \end{bmatrix}$$

Matrix form

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$$

Equation form

$$x + 0y = 3$$

$$0x + y = 2$$

answer.

$$\boxed{\begin{array}{l} x = 3 \\ y = 2 \end{array}}$$