

Solve using substitution, elimination and using row echelon form.

$$\begin{aligned} 3x + 2y &= 7 \\ 5x - y &= 3 \end{aligned}$$

Solve using substitution, elimination and using row echelon form.

$$\begin{aligned}x + 10y &= 30 \\2x - 5y &= 10\end{aligned}$$

Solve using substitution, elimination and using row echelon form.

$$2x + 4y = 8$$

$$2x - 4y = 0$$

Solve using substitution, elimination and using row echelon form.

$$\begin{aligned} 3x + 2y &= 7 \\ 5x - y &= 3 \end{aligned}$$

substitution:

$$\begin{aligned} 3x + 2y &= 7 & (1) \\ 5x - y &= 3 & (2) \end{aligned}$$

rearrange eq. (1)

$$3x + 2y = 7$$

$$\frac{3x}{3} = \frac{7-2y}{3}$$

$$x = \frac{7}{3} - \frac{2}{3}y$$

$$x = 2.\bar{3} - 0.\bar{6}y \quad (1a)$$

substitute eq. (1a) into (2)

$$5x - y = 3$$

$$5(2.\bar{3} - 0.\bar{6}y) - y = 3$$

$$11.\bar{6} - 3.\bar{3}y - y = 3$$

$$-3.\bar{3}y - y = 3 - 11.\bar{6}$$

$$\frac{-4.\bar{3}y}{-4.\bar{3}} = \frac{-8.\bar{6}}{-4.\bar{3}}$$

$$y = 2$$

substitute back into eq. (1a)

$$x = 2.\bar{3} - 0.\bar{6}y$$

$$x = 2.\bar{3} - 0.\bar{6}(2) = 2.\bar{3} - 1.\bar{3}$$

$$x = 1$$

elimination:

$$\begin{aligned} 3x + 2y &= 7 & (1) \\ 5x - y &= 3 & (2) \end{aligned}$$

multiply eq. (1) by 5

multiply eq. (2) by 3

$$15x + 10y = 35 \quad (1a)$$

$$15x - 3y = 9 \quad (2a)$$

subtract eq. (2a) from (1a)

$$\begin{aligned} 15x + 10y &= 35 \\ -(15x - 3y &= 9) \\ \hline 0x + 13y &= 26 \\ 13 & \quad 13 \end{aligned}$$

$$y = 2$$

substitute back into eq. (1)

$$3x + 2y = 7$$

$$3x + 2(2) = 7$$

$$3x + 4 = 7$$

$$\frac{3x}{3} = \frac{3}{3}$$

$$x = 1$$

row echelon:

$$\begin{aligned} 3x + 2y &= 7 \\ 5x - y &= 3 \end{aligned}$$

↓

$$\begin{bmatrix} 3 & 2 \\ 5 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ 3 \end{bmatrix}$$

↓

$$\begin{bmatrix} 3 & 2 & 7 \\ 5 & -1 & 3 \end{bmatrix}$$

$$R_1 \times \frac{1}{3} \rightarrow \begin{bmatrix} 1 & 0.\bar{6} & 2.\bar{3} \\ 0 & -4.\bar{3} & -8.\bar{6} \end{bmatrix}$$

$$R_2 - 5R_1 \rightarrow \begin{bmatrix} 1 & 0.\bar{6} & 2.\bar{3} \\ 0 & -4.\bar{3} & -8.\bar{6} \end{bmatrix}$$

$$R_1 - 0.\bar{6}R_2 \rightarrow \begin{bmatrix} 1 & 0 & 1 \\ 0 & -4.\bar{3} & -8.\bar{6} \end{bmatrix}$$

$$R_2 \times \frac{1}{-4.\bar{3}} \rightarrow \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix}$$

↓

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

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

Solve using substitution, elimination and using row echelon form.

$$\begin{aligned}x + 10y &= 30 \\2x - 5y &= 10\end{aligned}$$

Substitution:

$$\begin{aligned}x + 10y &= 30 & (1) \\2x - 5y &= 10 & (2)\end{aligned}$$

rearrange eq. (1)

$$x + 10y = 30$$

$$x = 30 - 10y \quad (1a)$$

sub eq. (1a) into (2)

$$2x - 5y = 10$$

$$2(30 - 10y) - 5y = 10$$

$$60 - 20y - 5y = 10$$

$$-25y = -50$$

$$\boxed{y = 2}$$

sub into eq. (1a)

$$x = 30 - 10y$$

$$x = 30 - 10(2)$$

$$\boxed{x = 10}$$

elimination:

$$\begin{aligned}x + 10y &= 30 & (1) \\2x - 5y &= 10 & (2)\end{aligned}$$

mult. eq. (1) by 2

$$\begin{aligned}2x + 20y &= 60 \\-(2x - 5y &= 10) \\ \hline 0x + 25y &= 50\end{aligned}$$

$$\boxed{y = 2}$$

sub into eq. (1)

$$x + 10y = 30$$

$$x = 30 - 10y$$

$$x = 30 - 10(2)$$

$$\boxed{x = 10}$$

row echelon:

$$\begin{bmatrix} 1 & 10 & 30 \\ 2 & -5 & 10 \end{bmatrix}$$

$$\begin{aligned}R_1 & \begin{bmatrix} 1 & 10 & 30 \end{bmatrix} \\ R_2 - 2R_1 & \begin{bmatrix} 0 & -25 & -50 \end{bmatrix}\end{aligned}$$

$$\begin{aligned}R_1 - 10R_2 & \begin{bmatrix} 1 & 0 & 10 \end{bmatrix} \\ R_2 \times -25 & \begin{bmatrix} 0 & 1 & 2 \end{bmatrix}\end{aligned}$$

$$\boxed{\begin{aligned}x &= 10 \\ y &= 2\end{aligned}}$$

Solve using substitution, elimination and using row echelon form.

$$2x + 4y = 8 \quad (1)$$

$$2x - 4y = 0 \quad (2)$$

Substitution:

$$2x + 4y = 8 \quad (1)$$

$$2x - 4y = 0 \quad (2)$$

rearrange eqn. (1)

$$2x = 8 - 4y$$

$$x = \frac{8 - 4y}{2}$$

$$x = 4 - 2y \quad (1a)$$

sub. (1a) into (2)

$$2(4 - 2y) - 4y = 0$$

$$8 - 4y - 4y = 0$$

$$-8y = -8$$

$$y = 1$$

sub into (1a)

$$x = 4 - 2(1)$$

$$= 2$$

$$x = 2$$

elimination:

$$\begin{array}{r} 2x + 4y = 8 \\ -(2x - 4y = 0) \\ \hline \end{array}$$

$$0x + 8y = 8$$

$$y = 1$$

sub into eqn. (1)

$$2x + 4(1) = 8$$

$$2x = 8 - 4$$

$$\frac{2x}{2} = \frac{4}{2}$$

$$x = 2$$

Row: Echelon:

$$\begin{bmatrix} 2 & 4 & 8 \\ 2 & -4 & 0 \end{bmatrix}$$

$$R_2 - R_1 \rightarrow \begin{bmatrix} 1 & 2 & 4 \\ 0 & -8 & -8 \end{bmatrix}$$

$$R_2 \div -8 \rightarrow \begin{bmatrix} 1 & 2 & 4 \\ 0 & 1 & 1 \end{bmatrix}$$

$$R_1 - 2R_2 \rightarrow \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 1 \end{bmatrix}$$

$$R_1 \div 2 \rightarrow \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

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

$$\begin{bmatrix} x = 1 \\ y = 1 \end{bmatrix}$$