Simultaneous Linear Equations

Ex 1

$$5x + 2y = 19 \quad (1)$$
$$x + 2y = 7 \quad (2)$$

(1) − (2)

$$4x = 12$$

$$x = \frac{12}{4} \qquad \underline{x = 3}$$

Sub for x in (2)

$$3 + 2y = 7$$
$$2y = 7 - 3$$
$$2y = 4$$
$$y = \frac{4}{2} \qquad \underline{y = 2}$$

$$\begin{cases} x = 3 \\ y = 2 \end{cases}$$

Ex 2

$$8x + 6y = 22 \quad (1)$$
$$5x + 3y = 13 \quad (2)$$

(2) × 2

$$10x + 6y = 26 \quad (3)$$

(3) − (1)

$$2x = 4$$

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

Sub for x in (2)

$$5(2) + 3y = 13$$
$$10 + 3y = 13$$

$$3y = 13 - 10$$
$$3y = 3$$
$$y = \frac{3}{3} \qquad \underline{y = 1}$$

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

Ex 3

$$5x + 2y = 24 \quad (1)$$
$$4x + 3y = 22 \quad (2)$$

(1) x 3 $\quad 15x + 6y = 72 \quad (3)$

(2) x 2 $\quad 8x + 6y = 44 \quad (4)$

(3) − (4) $\quad 7x = 28$

$$x = \frac{28}{7} \qquad \underline{x = 4}$$

Sub for x in (1)

$$5(4) + 2y = 24$$
$$20 + 2y = 24$$
$$2y = 24 - 20$$
$$2y = 4$$
$$y = \frac{4}{2} \qquad \underline{y = 2}$$

$$\begin{cases} x = 4 \\ y = 2 \end{cases}$$

Exercise

1)
$$8x + 2y = 24 \quad (1)$$
$$5x + 2y = 18 \quad (2)$$

2)
$$3x + 5y = 24 \quad (1)$$
$$7x + 10y = 51 \quad (2)$$

3)
$$7x + 5y = 22 \quad (1)$$
$$3x + 2y = 9 \quad (2)$$

Solutions

1)
$$8x + 2y = 24 \quad (1)$$
$$5x + 2y = 18 \quad (2)$$

(1) − (2)
$$3x = 6$$
$$x = \frac{6}{3} \qquad \underline{x = 2}$$

Sub for x in (1)

$$8(2) + 2y = 24$$
$$16 + 2y = 24$$
$$2y = 24 - 16$$
$$2y = 8$$
$$y = \frac{8}{2} \qquad \underline{y = 4}$$

$$\begin{cases} x = 2 \\ y = 4 \end{cases}$$

2)

$$3x + 5y = 24 \quad (1)$$
$$7x + 10y = 51 \quad (2)$$
$$6x + 10y = 48 \quad (3)$$

(1) × 2

(2) − (3)

$$\underline{x = 3}$$

Sub for x in (1)

$$3(3) + 5y = 24$$
$$9 + 5y = 24$$
$$5y = 24 - 9$$
$$5y = 15$$
$$y = \frac{15}{5} \qquad \underline{y = 3}$$

$$\begin{cases} x = 3 \\ y = 3 \end{cases}$$

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3)

$$7x + 5y = 22 \quad (1)$$
$$3x + 2y = 9 \quad (2)$$

(1) × 2

(2) × 5

$$14x + 10y = 44 \quad (3)$$
$$15x + 10y = 45 \quad (4)$$

(4) − (3)

$$\underline{x = 1}$$

Sub for x in (2)

$$3(1) + 2y = 9$$
$$3 + 2y = 9$$
$$2y = 9 - 3$$
$$2y = 6$$
$$y = \frac{6}{2} \qquad \underline{y = 3}$$

$$\begin{cases} x = 1 \\ y = 3 \end{cases}$$

Homework

1)
$$5x + 7y = 17$$
$$9x + 7y = 25$$

2)
$$7x + 4y = 26$$
$$5x + 2y = 16$$

3)
$$5x + 3y = 23$$
$$4x + 2y = 18$$
