Simultaneous Linear Equations

Ex 1

$$4x + 2y = 14 \quad (1)$$
$$9x + 6y = 36 \quad (2)$$

(1) × 3 $\quad 12x + 6y = 42 \quad (3)$

(3) − (2) $\quad 3x = 6$

$$x = \frac{6}{3}$$

$$\underline{x = 2}$$

Sub for x in (1)

$$4(2) + 2y = 14$$
$$8 + 2y = 14$$
$$2y = 14 - 8$$
$$2y = 6$$
$$y = \frac{6}{2} \qquad \underline{y = 3}$$

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

Ex 2

$$5x + 3y = 31 \quad (1)$$
$$4x + 2y = 24 \quad (2)$$

(1) × 2 $\quad 10x + 6y = 62 \quad (3)$

(2) × 3 $\quad 12x + 6y = 72 \quad (4)$

(4) − (3) $\quad 2x = 10$

$$x = \frac{10}{2} \qquad \underline{x = 5}$$

Sub for x in ①

$$5(5) + 3y = 31$$
$$25 + 3y = 31$$
$$3y = 31 - 25$$
$$3y = 6$$
$$y = \frac{6}{3} \qquad \underline{y = 2}$$

Exercise Solve

1)

$$5x + 2y = 12 \quad ①$$
$$10x + 8y = 28 \quad ②$$
$$20x + 8y = 48 \quad ③$$

① × 4

③ − ②

$$10x = 20$$
$$x = \frac{20}{10} \qquad \underline{x = 2}$$

Sub for x in ①

$$5(2) + 2y = 12$$
$$10 + 2y = 12$$
$$2y = 12 - 10$$
$$2y = 2$$
$$y = \frac{2}{2} \qquad \underline{y = 1}$$

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2)

$$2x + 3y = 17 \quad ①$$
$$3x + 4y = 23 \quad ②$$

$① \times 4 \qquad 8x + 12y = 68 \qquad ③$

$② \times 3 \qquad 9x + 12y = 69 \qquad ④$

$④ - ③ \qquad x = 1 \qquad \underline{x = 1}$

Sub for x in ①

$$2(1) + 3y = 17$$
$$2 + 3y = 17$$
$$3y = 17 - 2$$
$$3y = 15$$
$$y = \frac{15}{3} \qquad \underline{y = 5}$$

Example 3

$$5x - 2y = 11 \qquad ①$$
$$3x + 4y = 17 \qquad ②$$

$① \times 2 \qquad 10x - 4y = 22 \qquad ③$

$② + ③ \qquad 13x = 39$

$$x = \frac{39}{13} \qquad \underline{x = 3}$$

Sub for x in ②

$$3(3) + 4y = 17$$
$$9 + 4y = 17$$
$$4y = 17 - 9$$
$$4y = 8$$
$$y = \frac{8}{4} \qquad \underline{y = 2}$$

Ex 4

$$2x + 3y = 11 \quad (1)$$
$$3x - 2y = 10 \quad (2)$$

(1) × 2 $\quad 4x + 6y = 22 \quad (3)$

(2) × 3 $\quad 9x - 6y = 30 \quad (4)$

(3) + (4) $\quad 13x = 52$

$$x = \frac{52}{13} \qquad \underline{x = 4}$$

Sub for x in (1)

$$2(4) + 3y = 11$$
$$8 + 3y = 11$$
$$3y = 11 - 8$$
$$3y = 3$$
$$y = \frac{3}{3} \qquad \underline{y = 1}$$

Exercise

1)

$$5x + 8y = 34 \quad (1)$$
$$3x - 2y = 0 \quad (2)$$

(2) × 4 $\quad 12x - 8y = 0 \quad (3)$

(1) + (3) $\quad 17x = 34$

$$x = \frac{34}{17} \qquad \underline{x = 2}$$

Sub for x in (1)

$$5(2) + 8y = 34$$
$$10 + 8y = 34$$
$$8y = 34 - 10$$

$$8y = 24$$

$$y = \frac{24}{8} \qquad \underline{y = 3}$$

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2)

$$4x + 3y = 11 \quad (1)$$
$$3x - 2y = 4 \quad (2)$$

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

(2) $\times 3$ $\quad 9x - 6y = 12 \quad (4)$

(3) + (4) $\quad 17x = 34$

$$x = \frac{34}{17} \qquad \underline{x = 2}$$

sub for x in (1)

$$4(2) + 3y = 11$$
$$8 + 3y = 11$$
$$3y = 11 - 8$$
$$3y = 3$$
$$y = \frac{3}{3} \qquad \underline{y = 1}$$