

Simultaneous Equations – One Linear, One Quadratic

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

$$2) \begin{aligned} x + 2y &= 10 \\ x^2 + y^2 &= 65 \end{aligned}$$

$$3) \begin{aligned} 2x + y &= 5 \\ x^2 + y^2 &= 25 \end{aligned}$$

$$4) \begin{aligned} y &= 2x + 5 \\ x^2 + y^2 &= 50 \end{aligned}$$

$$5) \begin{aligned} x + 3y &= 5 \\ x^2 + y^2 &= 125 \end{aligned}$$

$$6) \begin{aligned} y &= 2x + 1 \\ x^2 + y^2 &= 29 \end{aligned}$$

$$7) \begin{aligned} x + y &= 7 \\ x^2 + y + y^2 &= 43 \end{aligned}$$

$$8) \begin{aligned} y &= 3x - 1 \\ x^2 + y^2 &= 73 \end{aligned}$$

$$9) \begin{aligned} x + y &= 5 \\ x^2 + x + y^2 &= 51 \end{aligned}$$

$$\begin{aligned} \textcircled{1} \quad & x^2 + (2x-5)^2 = 10 \\ & x^2 + 4x^2 - 20x + 25 = 10 \\ & 5x^2 - 20x + 15 = 0 \\ & x^2 - 4x + 3 = 0 \\ & (x-3)(x-1) = 0 \\ & x = 3 \quad \text{or} \quad x = 1 \\ & y = +1 \quad y = -3 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & x = 10 - 2y \\ & (10-2y)^2 + y^2 = 65 \\ & 100 - 40y + 4y^2 + y^2 = 65 \\ & 5y^2 - 40y + 35 = 0 \\ & y^2 - 8y + 7 = 0 \\ & (y-7)(y-1) = 0 \\ & y = 7 \quad \text{or} \quad y = 1 \\ & x = -4 \quad x = 8 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad & y = 5 - 2x \\ & x^2 + (5-2x)^2 = 25 \\ & x^2 + 25 - 20x + 4x^2 = 25 \\ & 5x^2 - 20x = 0 \\ & 5x(x-4) = 0 \\ & x = 0 \quad \text{or} \quad x = 4 \\ & y = 5 \quad y = -3 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & x^2 + (2x+5)^2 = 50 \\ & x^2 + 4x^2 + 20x + 25 = 50 \\ & 5x^2 + 20x + 25 = 0 \\ & x^2 + 4x + 5 = 0 \\ & (x+5)(x-1) = 0 \\ & x = -5 \quad \text{or} \quad x = 1 \\ & y = -5 \quad y = 7 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad & x = 5 - 3y \\ & (5-3y)^2 + y^2 = 125 \\ & 25 - 30y + 9y^2 + y^2 = 125 \\ & 10y^2 - 30y - 100 = 0 \\ & y^2 - 3y - 10 = 0 \\ & (y-5)(y+2) = 0 \\ & y = 5 \quad \text{or} \quad y = -2 \\ & x = -10 \quad x = 11 \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & x^2 + (2x+1)^2 = 29 \\ & x^2 + 4x^2 + 4x + 1 = 29 \\ & 5x^2 + 4x - 28 = 0 \\ & (5x+14)(x-2) = 0 \\ & x = -2.8 \quad \text{or} \quad x = 2 \\ & y = -4 \cdot 6 \quad y = 5 \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad & x = 7 - y \\ & (7-y)^2 + y + y^2 = 43 \\ & 49 - 14y + y^2 + y + y^2 = 43 \\ & 2y^2 - 13y + 6 = 0 \\ & (2y-1)(y-6) = 0 \\ & y = \frac{1}{2} \quad \text{or} \quad y = 6 \\ & x = 6\frac{1}{2} \quad x = 1 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & x^2 + (3x-1)^2 = 73 \\ & x^2 + 9x^2 - 6x + 1 = 73 \\ & 10x^2 - 6x - 72 = 0 \\ & 5x^2 - 3x - 36 = 0 \\ & (5x+12)(x-3) = 0 \\ & x = -2.4 \quad \text{or} \quad x = 3 \\ & y = -8.2 \quad y = 8 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad & y = 5 - x \\ & x^2 + x + (5-x)^2 = 51 \\ & x^2 + x + 25 - 10x + x^2 = 51 \\ & 2x^2 - 9x - 26 = 0 \\ & (2x-13)(x+2) = 0 \\ & x = 6\frac{1}{2} \quad \text{or} \quad x = -2 \\ & y = -1\frac{1}{2} \quad y = 7 \end{aligned}$$