Simultaneous Equations – One Linear, One Quadratic

1) $y = 2x - 5$
   $x^2 + y^2 = 10$

2) $x + 2y = 10$
   $x^2 + y^2 = 65$

3) $2x + y = 5$
   $x^2 + y^2 = 25$

4) $y = 2x + 5$
   $x^2 + y^2 = 50$

5) $x + 3y = 5$
   $x^2 + y^2 = 125$

6) $y = 2x + 1$
   $x^2 + y^2 = 29$

7) $x + y = 7$
   $x^2 + y + y^2 = 43$

8) $y = 3x - 1$
   $x^2 + y^2 = 73$

9) $x + y = 5$
   $x^2 + x + y^2 = 51$

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

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

③
$$y = 5 - 2x$$
$$x^2 + (5-2x)^2 = 25$$
$$x^2 + 25 - 20x + 4x^2 = 25$$
$$5x^2 - 20x = 0$$
$$5x(x-4) = 0$$
$$x = 0 \quad \text{or} \quad x = 4$$
$$y = 5 \qquad y = -3$$

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

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

⑥
$$x^2 + (2x+1)^2 = 29$$
$$x^2 + 4x^2 + 4x + 1 = 29$$
$$5x^2 + 4x - 28 = 0$$
$$(5x + 14)(x - 2) = 0$$
$$x = -2.8 \quad \text{or} \quad x = 2$$
$$y = -4.6 \qquad y = 5$$

⑦
$$x = 7 - y$$
$$(7-y)^2 + y + y^2 = 43$$
$$49 - 14y + y^2 + y + y^2 = 43$$
$$2y^2 - 13y + 6 = 0$$
$$(2y-1)(y-6) = 0$$
$$y = \tfrac{1}{2} \quad \text{or} \quad y = 6$$
$$x = 6\tfrac{1}{2} \qquad x = 1$$

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

⑨
$$y = 5 - x$$
$$x^2 + x + (5-x)^2 = 51$$
$$x^2 + x + 25 - 10x + x^2 = 51$$
$$2x^2 - 9x - 26 = 0$$
$$(2x - 13)(x + 2) = 0$$
$$x = 6\tfrac{1}{2} \quad \text{or} \quad x = -2$$
$$y = -1\tfrac{1}{2} \qquad y = 7$$