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19/ ENCO2 / 012

$$1) \quad x - y - 14 = 0 \\ x^2 + y^2 - 6x + 8y = 0$$

$$x = y + 14 \quad \text{--- (1)}$$

$$(y+14)^2 + y^2 - 6(y+14) + 8y = 0$$

$$y^2 + 28y + 196 + y^2 - 6y - 84 + 8y = 0$$

Collect like terms.

$$y^2 + y^2 + 28y - 6y + 8y + 196 - 84 = 0$$

$$2y^2 + 30y + 112 = 0$$

$$y^2 + 15y + 56 = 0$$

$$y^2 + 7y + 8y + 56 = 0$$

$$y(y+7) + 8(y+7) = 0$$

$$(y+8)(y+7) = 0$$

$$y = -8 \quad \text{or} \quad -7$$

Substitute values of y in equation to get x

$$x = y + 14$$

$$x = -8 + 14$$

$$x = 6$$

$$\text{When } y = -7$$

$$x = -7 + 14$$

$$x = 7$$

The points of intersection are
 $(6, -8)$ and $(7, -7)$

$$2) \quad 2x + y - 10 = 0 \text{ and } x^2 + y^2 + 4x - 6y = 0$$

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

$$x^2 + (10 - 2x)^2 + 4x - 6(10 - 2x) = 0$$

$$x^2 + 4x^2 - 40x + 100 + 4x - 60 + 12x = 0$$

collecting like terms

$$5x^2 - 40x + 16x + 100 - 60 = 0$$

$$5x^2 - 24x + 40 = 0$$

$$25x^2 - 12x + 20 = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{12 \pm \sqrt{144 - 4(25 \times 20)}}{5}$$

$$\frac{12 \pm \sqrt{144 - 200}}{5}$$

$$x = \frac{12 \pm \sqrt{56}}{5}$$

$$x = \frac{12 + \sqrt{56}}{5} \quad \text{or} \quad \frac{12 - \sqrt{56}}{5}$$

$$x = \frac{12 + 7.48}{5} \quad \text{or} \quad \frac{12 - 7.48}{5}$$

$$x = \frac{19.48}{5} \quad \text{or} \quad \frac{4.52}{5}$$

$$x = 3.896 \quad \text{or} \quad 0.904$$

Subst for x in eqn 1

$$\text{when } x = 3.896$$

$$y = 10 - 2(3.896) = 10 - 7.792 = 2.208$$

when x is 0.904

$$y = 10 - (2 \times 0.904)$$

$$y = 10 - 1.808$$

$$= 8.192$$

\therefore

The points of intersection are

$$(3.898, 2.208) \text{ and } (0.904, 8.192)$$

3.) $x - 5y - 2 = 0$ and $x^2 + 25y^2 - 6xy - 6 = 0$

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

$$(5y + 2)^2 + 25y^2 - 6(5y + 2)y - 6 = 0$$

$$25y^2 + 120y + 144 + 25y^2 - 30y^2 - 12y - 6 = 0$$

Like terms

$$20y^2 - 120y - 12y$$

$$20y^2 - 132y + 128$$

$$10y^2 - 66y + 64$$

$$y^2 - 6.6y + 6.4$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{6.6 \pm \sqrt{43.56 - 25.6}}{2}$$

$$\frac{6.6 \pm \sqrt{17.96}}{2}$$

$$\frac{6.6 + 4.238}{2} \text{ or } \frac{6.6 - 4.238}{2}$$

$$\frac{10.838}{2} \text{ or } \frac{2.362}{2}$$

$$y = 5.419 \text{ or } 1.181$$

Substitute for y in eqn 1

$$\text{when } y = 5.419$$

$$x = 5y + 2$$

$$x = 29.095$$

$$\text{when } y = 1.181$$

$$x = 5(1.181) + 2$$

$$x = 7.905$$

Points of intersection are

$$(29.095, 5.419) \text{ and}$$

$$(7.905, 1.181)$$