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Matts. No: 19/ENG01/015

Serial No: 17

Math 102 Assignment

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

$$x - y - 14 = 0 \quad - \textcircled{1}$$

$$x^2 + y^2 - 6x + 8y = 0 \quad - \textcircled{2}$$

Make  $y$  subject of in eqn  $\textcircled{1}$

$$y = x - 14$$

Substitute  $y = x - 14$  into eqn  $\textcircled{2}$

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

$$x^2 + x^2 - 28x + 196 - 6x + 8x - 112 = 0$$

$$2x^2 - 26x + 84 = 0$$

$$x^2 - 13x + 42 = 0 \quad ; \quad x^2 - 7x - 6x + 42$$

$$(x - 6)(x - 7); \quad x = 6 \text{ and } x = 7$$

When  $x = 6$

when  $x = 7$

$$y = 6 - 14 = -8$$

$$y = 7 - 14 = -7$$

$\therefore$  the points of intersection are  $(6, -8)$  and  $(7, -7)$

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

$$y = 10 - 2x$$

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

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

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

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

Can't intersect.

$$3.) x - 5y - 2 = 0 \quad \text{and} \quad x^2 + 25y^2 - 6xy - 16 = 0$$

$x = 5y + 2$  Substituting  $x = 5y + 2$  into eqn of circle

$$(5y + 2)^2 + 25y^2 - 6(5y + 2)y - 16 = 0$$

$$25y^2 + 20y + 4 + 25y^2 - 30y^2 - 12y - 16 = 0$$

$$20y^2 + 8y - 12 = 0$$

$$20y^2 + 20y - 12y - 12 = 0$$

$$20y(y + 1) - 12(y + 1) = 0$$

$$(20y - 12)(y + 1) = 0$$

$$\therefore y = \frac{3}{5} \quad \text{and} \quad y = -1$$

$$\text{when } y = \frac{3}{5}$$

$$x = 5\left(\frac{3}{5}\right) + 2$$

$$x = 3 + 2 = 5$$

$$\text{when } y = -1$$

$$x = 5(-1) + 2$$

$$x = -5 + 2 = -3$$

$\therefore$  the points of intersection are  $(5, \frac{3}{5})$  and  $(-3, -1)$