

Mā. No : 16/mh/soil/219

Dept. : Computer Engineering

Transfer Student

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

$y = x - 14$  . . . . (1)

Sub  $y = x - 14$  into eqn of a circle

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

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

$x^2 + x^2 - 28x + 196 - 6x + 8(x - 14) = 0$

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

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

$x^2 - 13x + 42 = 0$

$(x^2 - 6x) - (7x + 42) = 0$

$x(x - 6) - 7(x + 6) = 0$

$(x - 7)$  and  $(x - 6)$

When  $x = 7$

$y = x - 14$

$7 - 14 = -7$

A Point of intersection is  $(7, -7)$

When  $x = 6$

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

Another point of intersection is  $(6, -8)$

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

$y = 10 - 2x$

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

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

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

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

Using quadratic formula

$$a = 5, b = -24, c = 40$$

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

$$x = \frac{24 \pm \sqrt{(-24)^2 - 4(5 \times 40)}}{2 \times 5}$$

$$x = \frac{24 \pm \sqrt{576 - 800}}{10}$$

$$x = \frac{12 + 2\sqrt{14}}{5} \quad \text{or} \quad \frac{12 - 2\sqrt{14}}{5}$$

$$(3) \quad x - 5y - 2 = 0$$

$$x^2 + 25y^2 - 6xy - 16 = 0$$

$$x - 5y - 2 = 0$$

$$\frac{5y}{5} = \frac{x-2}{5}$$

$$\therefore y = \frac{x-2}{5}$$

Sub  $y = \frac{x-2}{5}$  into eqn of the circle

$$x^2 + 25 \left( \frac{x-2}{5} \right)^2 - 6x \left( \frac{x-2}{5} \right) - 16 = 0$$

$$5 \left( x^2 + 25 \times \left( \frac{x-2}{5} \right)^2 - 6x \times \left( \frac{x-2}{5} \right) \right) - 80 = 0$$

$$5 \left( \frac{x^2 + 25 \frac{(x-2)^2}{5^2} - 6x \times \left( \frac{x-2}{5} \right)}{5^2} \right) - 80 = 0$$

$$5 \left( \frac{5^2 \times x^2 + 25 \frac{(x-2)^2}{5^2} - 6x \times \left( \frac{x-2}{5} \right)}{5^2} \right) - 80 = 0$$

$$5 \left( \frac{25x^2 + 25x^2 - 100x + 100 - 6x \times \left( \frac{x-2}{5} \right)}{5^2} \right) - 80 = 0$$

$$5 \left( \frac{25x^2 + 25x^2 - 100x + 100 - \frac{6(x-2)x}{5}}{5^2} \right) - 80 = 0$$

$$5 \left( \frac{50x^2 + 100x + 100}{5^2} - \frac{6(x-2)x}{5} \right) - 80 = 0$$

$$5 \left( \frac{50x^2 - 100x + 100}{5^2} - \frac{6(x-2)x}{5} \right) - 80 = 0$$

$$5 \left( 4 - 4x - 2x^2 - \frac{6(x-2)x}{5} \right) - 80 = 0$$

$$5 \left( 4 - \frac{8}{5}x + \frac{4}{5}x^2 \right) - 80 = 0$$

$$20 - 8x - 4x^2 - 80 = 0$$

$$-60 - 8x + 4x^2 = 0$$

$$4x^2 - 8x + 60 = 0$$

$$x^2 - 2x + 15 = 0$$

Using the quadratic formula

$$a = 4 \quad b = -8 \quad c = 60$$

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

$$= \frac{+8 \pm \sqrt{64 - 4(-4 \times 60)}}{8}$$

$$x = \frac{8 \pm 32}{8}$$

$$x = \frac{8+32}{8} \quad \text{or} \quad \frac{8-32}{8}$$

$$= \frac{40}{8} \quad \text{or} \quad \frac{-24}{8}$$

$$x = 5 \quad x = -3$$

When  $x = 5$

$$y = 5 - \frac{2}{5} = \frac{23}{5}$$

$\therefore$  A point of intersection is  $(5, \frac{23}{5})$

When  $x = -3$

$$y = -3 - \frac{2}{5} = -\frac{17}{5} = -1$$

Another point of intersection is  $(-3, -1)$