

PINNICK TISE ORTSEISE RUNDEDE

CHEMICAL ENGINEERING

19/ENGG01/013

MA102 Assignment

Question

Find the point of intersection of the following line on the circle.

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

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

3 $x - 5y - 2 = 0$ and $x^2 + 25y^2 - 6xy - 16 = 0$

Solutions

1 $x - y - 14 = 0$ --- equ (i) $\Rightarrow x = y + 14$ --- equ (ii)
 $x^2 + y^2 - 6x + 8y = 0$ --- equ (iii)

put equ (ii) into equ (iii).

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

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

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

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

$$\therefore y = -7, y = -8$$

where $y = -7$ using equ (i)

$$x - (-7) - 14 = 0$$

$$x + 7 - 14 = 0$$

$$x - 7 = 0$$

$$x = 7$$

$$3 \quad x - 5y - 2z = 0 \quad \dots \text{equ (i)}$$

$$x^2 - 25y^2 - 6xy - 16z = 0 \quad \dots \text{equ (ii)}$$

From equ (i)

$$x = 5y + 2 \quad \dots \text{equ (iii)}$$

Put equ (iii) into equ (ii)

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

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

$$25y^2 + 25y^2 - 30y^2 + 8y - 16z = 0$$

$$20y^2 + 8y - 16z = 0$$

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

Where $y = \frac{3}{5}$

$$x - 5\left(\frac{3}{5}\right) - 2z = 0$$

$$x - 3 - 2z = 0$$

$$x - 5 = 0$$

$$x = 5$$

Where $y = -1$

$$x - 5(-1) - 2z = 0$$

$$x + 5 - 2z = 0$$

$$x + 3 = 0$$

$$x = -3$$

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