Collins Sarima Lennenda

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Computer Science

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

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

Soln

$x - y - 14 = 0$

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

$x^2 + x^2 - 28x + 196 - 6x - 112 + 8x = 0 \quad \ldots \text{(ii)}$

$2x^2 - 26x + 84$

$a = 2$

$b = -26$

$c = 84$

using formula method

$$\frac{+26 \pm \sqrt{(-26)^2 - 4(2)(84)}}{2(2)}$$

$$= \frac{+26 \pm \sqrt{676 - 672}}{4}$$

$$x = \frac{+26 \pm \sqrt{4}}{4}$$

$$= \frac{+26 + \sqrt{4}}{4} \quad \text{or} \quad \frac{+26 - \sqrt{4}}{4}$$

$$= \frac{26 + 2}{4} \quad \text{or} \quad \frac{26 - 2}{4}$$

$$= 7 \quad \text{or} \quad 6$$

substituting $x = 7$ into equation (i) we have

$y = x - 14$

$= 7 - 14$

$= -7$

Therefore 1 of the points of intersection is $(7, -7)$

substituting $x = 6$ in equation (i) we hav

$y = -14 + x$

$y = -14 + 6$

$= -8$

The second point of intersection is
(6, -8)

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

soln

$y = 10 - 2x \ldots (i)$

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

$5x - 24x + 40 = 0$

There will be no points of intersection since there are no real roots

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

$y = \frac{-2 + x}{5} \ldots (i)$

$x^2 + 25\left[\frac{x^2 - 4x + 4}{25}\right] + \frac{12x - 6x^2}{5} - 16 = 0 \ldots (ii)$

$x^2 + x^2 - 4x + 4 + \frac{12x - 6x^2}{5} - 16 = 0$

$2x^2 - 4x - 12 + \frac{12x - 6x^2}{5} = 0$

$\frac{10x^2 - 20x - 60 + 12x - 6x^2}{5} = 0$

$10x^2 - 20x - 60 + 12x - 6x^2 = 0$

$4x^2 - 8x - 60$

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

$b = -8$

$c = -60$

$\frac{8 \pm \sqrt{64 + 960}}{8} = \frac{8 \pm \sqrt{1024}}{8}$

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

$= \frac{8 + 32}{8}$ or $\frac{8 - 32}{8}$

5 or -3

substituting $x = 5$ in equation (i) we have

$$y = \frac{-2+5}{3} = \frac{3}{5}$$

Therefore one of the points of intersection is $(5, 3/5)$

substituting $x = -3$ in equation (i) we have

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

Therefore another point of intersection is $(-3, -1)$