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ASSIGNMENT

Q2) Find the point of intersection of the following line on the circle.

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

Solution

$x-y-14=0$

$y=x-14 \quad \ldots (i)$

$x^2+y^2-6x+8y=0 \quad \ldots (ii)$

Substitute $y=x-14$ in eqn (ii)

$x^2+(y)^2 \quad x^2+[(x-14)(x-14)]-6x+8(x-14)=0$

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

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

$2x^2-12x-14x+84=0$

$2x(x-6)-14(x-6)$

$(2x-14)(x-6)=0$

$2x=14$ or $x=6$

$x=\frac{14}{2}$ or $x=6$

$x=7$ or $x=6$

Substituting $x=6$ in eqn (i)

$y=x-14$

$y=6-14$

$y=-8$

Therefore, one of the points of intersection is $(6,-8)$

Substituting $x=7$ in eqn (i)

$y = x - 14$

$y = 7 - 14$

$y = -7$

Therefore another point of intersection is $(7, -7)$

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

$2x + y - 10 = 0$

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

$x^2 + y^2 + 4x - 6y = 0 \quad \ldots (ii)$

Substituting $y = 10 - 2x$ in eqn (ii)

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

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

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

$5x^2 - 20x - 4x + 40 = 0$ $\quad x = 3.9$ or ~~$x = -1.5$~~ $x = 0.9$

$5x(x - 4) - 4(x - 4)$ Substitute $x = 3.9$ in eqn (i)

$y = 10 - 2(3.9)$

$y = 10 - 7.8$

$y = 2.2$

Therefore one of the points of intersection is ~~$(-1.5, 7)$~~ $(3.9, 2.2)$

Substituting $x = 0.9$ in eqn (i)

$y = 10 - 2(0.9)$

$y = 10 - 1.8$

$y = 8.2$

Therefore one of the points of intersection is ~~$(-1.5, 13)$~~ $(0.9, 8.2)$

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

$x-5y-2=0$

$5y=x-2$

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

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

$x^2+25y^2-6xy-16=0$ .... (ii)

Substitute $y=\frac{x-2}{5}$ in eqn (ii)

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

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

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

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

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

$\frac{4x^2-8x-60}{5}=0$

$\frac{x^2-2x-15}{5}=0$

$\frac{x^2}{5}-\frac{2x}{5}-\frac{15}{5}=0$

$\frac{x^2}{5}-\frac{2x}{5}-3=0$

$x=5$ or $x=-3$

Substitute $x=5$ in eqn (i)

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

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

Therefore one of the points of intersection is $(5,\frac{3}{5})$

Substitute $x=-3$ in eqn (i)

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

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

$y=-1$

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