DARE BENEDICT OLUBUKOLA
MECHANICAL ENGINEERING
19/ENG06/016 SERIAL NO. ; 111
MAT 102 ASSIGNMENT

Find the Point of intersection of the following line of the circle:

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

Solution

$x - y - 14 = 0$ — ①

$x^2 + y^2 - 6x + 8y = 0$ — ②

From eqn ①;

$x = y + 14$ — ③

Substituting eqn ③ into eqn ②

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

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

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

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

$$y = \frac{-30 \pm \sqrt{(30)^2 - 4 \times 2 \times 112}}{2(2)}$$

Scanned by TapScanner

$$y = \frac{-30 \pm 2}{4}$$

$\therefore y = -7$ or -8

Substituting $y = -7$ in eqn ③; we have,

$x = y + 14$

$x = -7 + 14$

$x = \underline{\underline{7}}$

$\therefore$ One of the points of intersection is $(7, -7)$

Substituting $y = -8$ in eqn ③; we have,

$x = y + 14$

$x = -8 + 14$

$x = 6$

$\therefore$ The other point of intersection is $(6, -8)$

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

<u>Solution</u>

$2x + y - 10 = 0$ —— ①

$x^2 + y^2 + 4x - 6y = 0$ —— ②

From eqn ①;

$y = 10 - 2x$ —— ③

Substitute eqn ③ in eqn ②

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

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

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

x is an imaginary number so the line doesn't intersect.

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

Solution

$x - 5y - 2 = 0$ —— ①

$x^2 + 25y^2 - 6xy - 16 = 0$ —— ②

From eqn ①;

$x = 5y + 2$ —— ③

Substituting eqn ③ into eqn ②

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

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

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

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

$$y = \frac{-8 \pm \sqrt{(8)^2 - 4 \times 20 \times (-12)}}{2(20)}$$

$$y = \frac{-8 \pm 32}{40}$$

$\therefore y = -1$ or $3/5$

Substituting $y = -1$ in eqn ③; we have,

$x = 5y + 2$

$x = 5(-1) + 2$

$x = -3$

$\therefore$ One of the points of intersection is $(-3, -1)$

Substituting $y = 3/5$ in eqn ③; we have,

$x = 5y + 2$

$x = 5(3/5) + 2$

$x = 5$

$\therefore$ The other point of intersection is $(5, 3/5)$