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19/SCI01/041

NAT 104

Assignment

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

solution

$x - y - 14 = 0$ ——— (i)

$x^2 + y^2 - 6x + 8y = 0$ ——— (ii)

Make y Subject of the formular in eqn (i)

$x - y - 14 = 0$

$-y = -(14 - x)$

$y = x - 14$ ——— (iii)

Substitute $y = x - 14$ in equation ——— (ii)

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

$x^2 + (x - 14)(x - 14) - 6x + 8x - 112 = 0$

$x^2 + x^2 - 14x - 14x + 196 - 6x + 8x - 112 = 0$

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

Divide though by 2

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

$42x^2$

$-6 \quad -7$

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

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

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

$x - 7 = 0$ or $x - 6 = 0$

$x = 7$ $\quad$ $x = 6$

Substitute $x = 7$ in eqn (ii)

$y = x - 14$

$y = 7 - 14$

$y = -7$

Therefore one of the Points of intersection is $(7, -7)$

Substitute $x = 6$ in eqn (iii)

$y = x - 14$

$y = 6 - 14$

$y = -8$

Therefore another ~~the~~ Point of Intersection is $(6, -8)$

Point of Intersection : $(7, -7)$ and $(6, -8)$

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

Solution

$2x + y - 10 = 0$ ——— (i)

$x^2 + y^2 + 4x - 6y = 0$ ——— (ii)

Make y Subject of the formula in eqn (i)

$2x + y - 10 = 0$

$y = 10 - 2x$

Subs. $y = 10 - 2x$ in equation — (ii)

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

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

$x^2 + (10 - 2x)(10 - 2x) + 4x - 60 + 12x = 0$

$x^2 + 100 - 20x - 20x + 4x^2 + 4x - 60 + 12x = 0$

$5x^2 - 20x - 20x + 4x + 12x + 100 - 60 = 0$

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

Using the quadratic equation

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

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

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

$\cancel{x}$

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

$x = \cancel{24 \pm}$

$$x = \frac{24 \pm \sqrt{-224}}{10}$$

If the discriminant (being the expression $b^2 - 4ac$) has a value which is negative, there will be no x - Intercept i.e. there is no real number for the Solution

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

$x - 5y - 2 = 0$ ——— (i)

$x^2 + 25y^2 - 6xy - 16 = 0$ ——— (ii)

make x the subject of the formula in equation (i)

$x - 5y - 2 = 0$

$x = 5y + 2$ ——— (iii)

Substitute $x = 5y + 2$ in ——— (ii)

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

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

$(5y+2)(5y+2) + 25y^2 - 30y^2 + 12y - 16 = 0$

$25y^2 + 10y + 10y + 4 + 25y^2 - 30y^2 - 12y - 16 = 0$

$25y^2 + 25y^2 + 10y + 10y - 12y + 4 - 16 - 30y^2 = 0$

$50y^2 - 30y^2 + 8y - 12 = 0$

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

Divide through by 2

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

$-60y^2$

$10 \quad -6$

$10y^2 + 10y - 6y - 6 = 0$

$10y(y+1) - 6(y+1) = 0$

$(10y - 6)(y + 1) = 0$

$10y - 6 = 0$ or $y + 1 = 0$

$$\frac{\cancel{10}y}{\cancel{10}} = \frac{6}{10} \quad \text{or} \quad y = -1$$

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

Substitute $y = 3/5$ in eqn (iii)

$x = 5y + 2$

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

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

Substitute $y = -1$ in eqn — (iii)

$x = 5y + 2$

$x = 5(-1) + 2$

$x = -5 + 2$

$x = -3$

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

Point of Intersection is $(5, 3/5)$ and $(-3, -1)$