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19/ENG04/002
MAT 102
ELECT/ELECT

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

$x - y - 14 = 0 \quad \ldots (i)$

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

$x = y + 14 \quad \ldots (iii)$

Substitute equation (iii) into (ii)

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

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

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

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

$y^2 + 15y + 56 = 0$

$y^2 + 7y + 8y + 56 = 0$

$y(y+7) + 8(y+7) = 0$

$(y+8)(y+7) = 0$

$y = -8$ or -7

Since $x = y + 14$

x when y is -7

$x = -7 + 14$

$x = 7$

when y is -8

$x = -8 + 14$

$x = 6$

Points of Intersection: $(7, -7)$, $(6, -8)$

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

$2x+y-10=0$ ---(i)

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

$y=10-2x$ ---(iii)

Substitute (iii) into (ii)

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

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

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

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

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

$$x=\frac{-(-24)\pm\sqrt{(-24)^2-4(5\times40)}}{2(5)}$$

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

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

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

$x - 5y - 2 = 0$ --- (i)

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

$x = 5y + 2$ --- (iii)

Substitute (iii) into (i)

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

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

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

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

$20y(y + 1) - 12(y + 1) = 0$

$(20y - 12)(y + 1) = 0$

$y = 3/5$ or -1

Since $x = 5y + 2$

when $y = 3/5$

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

$x = 5$

when $y = -1$

$x = 5(-1) + 2$

$x = -3$

Points of Intersection : $(5, 3/5)$, $(-1, -3)$