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Assignment

1) $x^2 - y - 14 = 0$ --- (i)
 $x^2 + y^2 - 6x + 8y = 0$ --- (ii)
 $x = y + 14$ --- (iii)

Substitute equation (iii) into (ii)
 $(y+14)^2 + y^2 - 6(y+14) + 8y = 0$
 $y^2 + 28y + 196 + y^2 - 6y - 84 + 8y = 0$
 $2y^2 + 30y + 112 = 0$
 $2y^2 + 30y = -112$
 $y^2 + 15y + 56 = 0$
 $y^2 + 7y + 8y + 56 = 0$
 $y(y+7) + 8(y+7) = 0$
 $(y+8)(y+7) = 0$
 $y = -2$ or -7

Since $x = y + 14$
 when $y = -7$
 $x = -7 + 14$
 $x = 7$
 when $y = -8$
 $x = -8 + 14$
 $x = 6$

Points of intersection = $(7, -7), (6, -8)$

2) $2x + y - 10 = 0$ --- (i)
 $x^2 + y^2 + 4x - 6y = 0$ --- (ii)
 $y = 10 - 2x$ --- (iii)
 Substitute (iii) into (ii)

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$x^2 + (10-2x)^2 + 4x - 6(10-2x) = 0$
 $x^2 + 100 - 40x + 4x^2 + 4x - 60 + 12x = 0$
 $5x^2 + 40 - 24x = 0$
 $5x^2 - 24x + 40 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $x = \frac{-(-24) \pm \sqrt{(-24)^2 - 4(5 \times 40)}}{2(5)}$
 $x = \frac{24 \pm \sqrt{-224}}{10}$

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.

3) $x - 5y - 2 = 0$ --- (i)
 $x^2 + 25y^2 - 6xy - 16 = 0$ --- (ii)
 $x = 5y + 2$ --- (iii)

Substitute (iii) into (ii)
 $(5y+2)^2 + 25y^2 - 6y(5y+2) - 16 = 0$
 $25y^2 + 20y + 4 + 25y^2 - 30y^2 - 12y - 16 = 0$
 $20y^2 + 8y - 12 = 0$
 $20y^2 + 20y - 12y - 12 = 0$
 $20y(y+1) - 12(y+1) = 0$
 $(20y-12)(y+1) = 0$
 $y = 3/5$ or -1

Since $x = 5y + 2$
 when $y = 3/5$
 $x = 5(3/5) + 2 = 5$
 when $y = -1$
 $x = 5(-1) + 2 = -3$

\therefore Point of intersection: $(5, 3/5), (-3, -1)$

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