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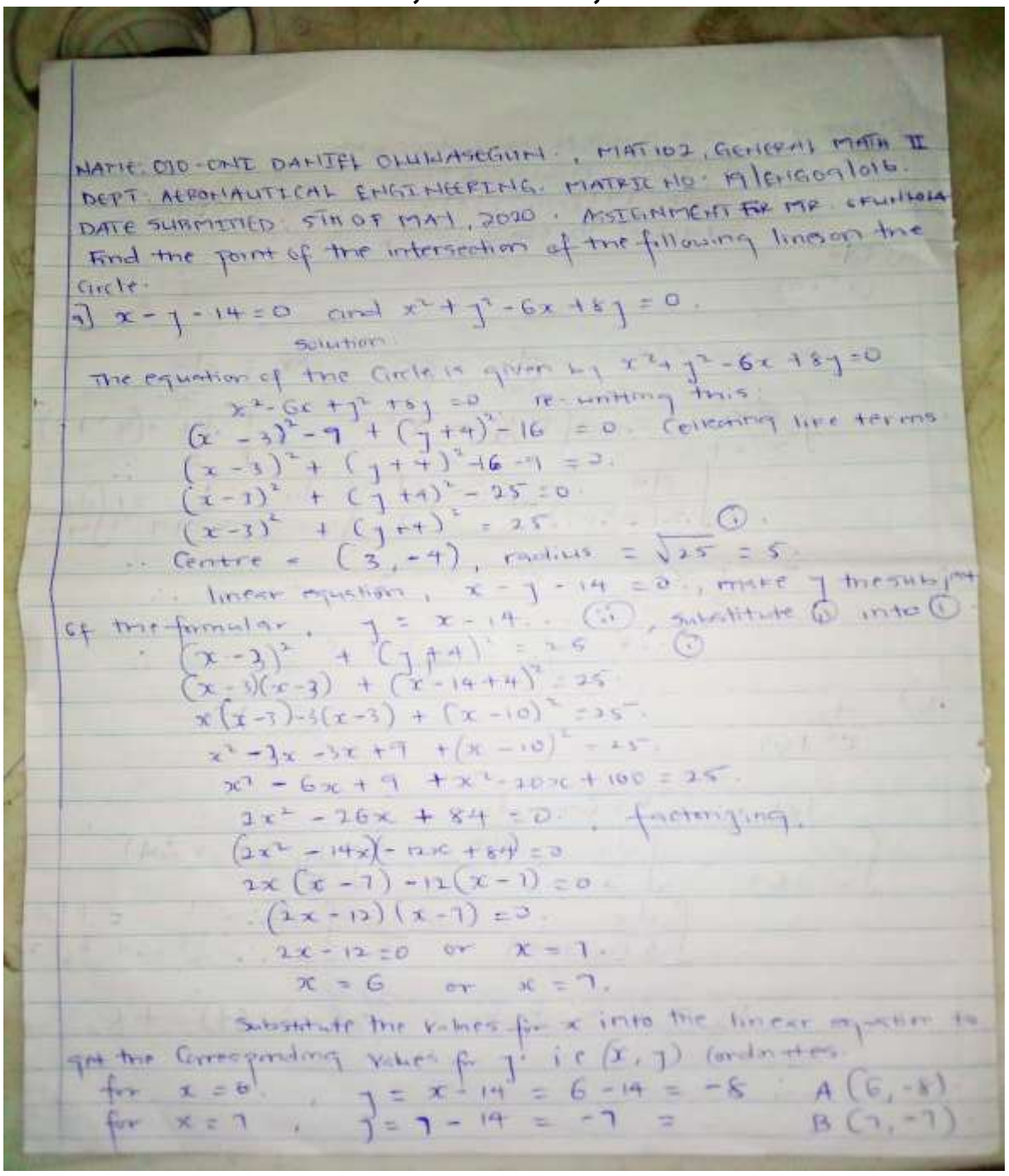

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Find the point of the intersection of the following lines on the circle.

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

Solution:

The equation of the circle is given by $x^2 + y^2 - 6x + 8y = 0$

$x^2 - 6x + y^2 + 8y = 0$ re-writing this.

$(x-3)^2 - 9 + (y+4)^2 - 16 = 0$. Collecting like terms

$(x-3)^2 + (y+4)^2 - 16 - 9 = 0$.

$(x-3)^2 + (y+4)^2 - 25 = 0$.

$(x-3)^2 + (y+4)^2 = 25$ ... (i).

∴ Centre = $(3, -4)$, radius = $\sqrt{25} = 5$.

∴ linear equation, $x - y - 14 = 0$, make y the subject of the formular. $y = x - 14$ ... (ii), substitute (ii) into (i)

$(x-3)^2 + (y+4)^2 = 25$ (i)

$(x-3)(x-3) + (x - 14 + 4)^2 = 25$

$x(x-3) - 3(x-3) + (x-10)^2 = 25$

$x^2 - 3x - 3x + 9 + (x-10)^2 = 25$

$x^2 - 6x + 9 + x^2 - 20x + 100 = 25$.

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

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

$2x(x-7) - 12(x-7) = 0$

$(2x - 12)(x - 7) = 0$

$2x - 12 = 0$ or $x = 7$.

$x = 6$ or $x = 7$.

Substitute the values for x into the linear equation to get the corresponding values for y i.e (x, y) coordinates.

for $x = 6$, $y = x - 14 = 6 - 14 = -8$ A $(6, -8)$

for $x = 7$, $y = 7 - 14 = -7$ = B $(7, -7)$

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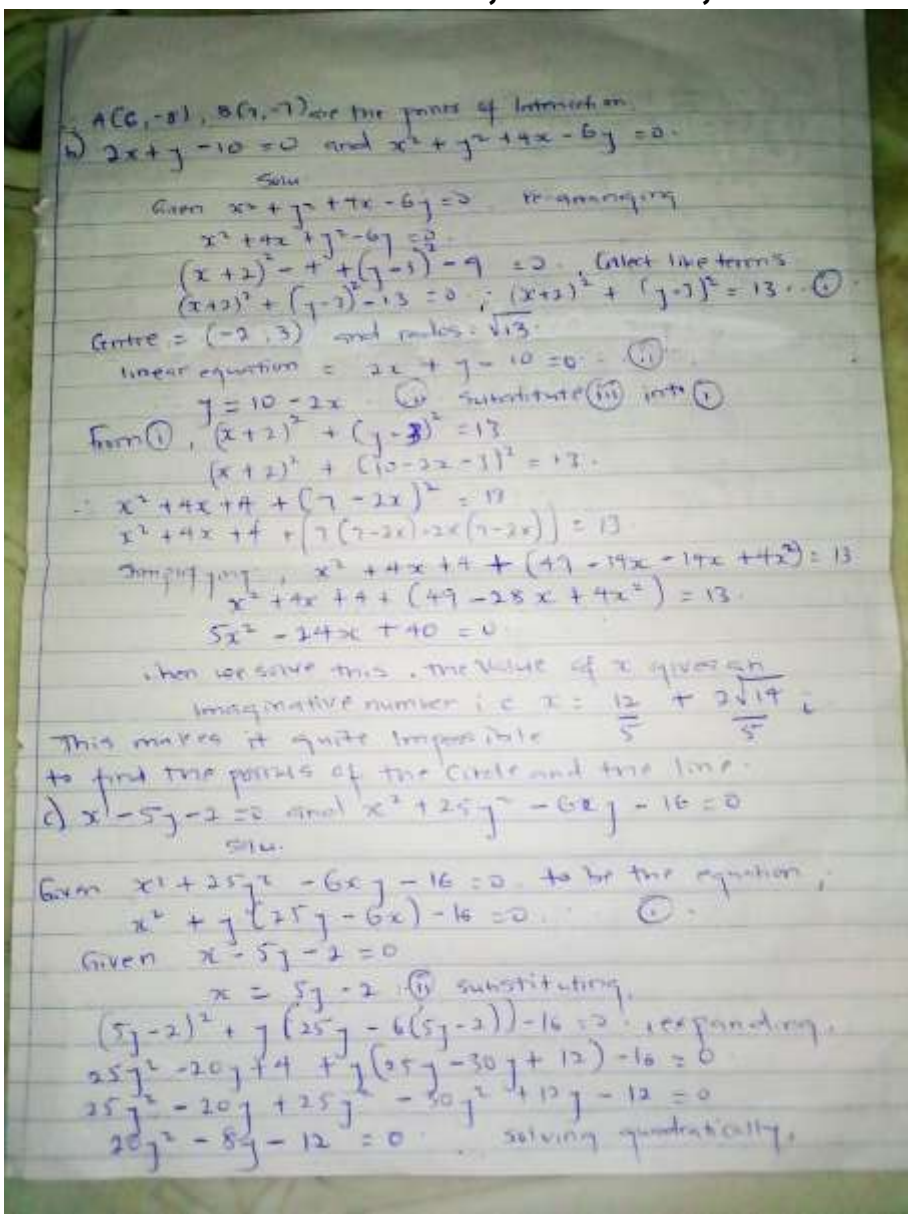

A(6,-8), B(9,-7) are the points of intersection
b) $2x+y-10=0$ and $x^2+y^2+4x-6y=0$.

Solu

Given $x^2+y^2+4x-6y=0$ re-arranging

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

$(x+2)^2-4+(y-3)^2-9=0$; Collect like terms

$(x+2)^2+(y-3)^2-13=0$; $(x+2)^2+(y-3)^2=13$ ... (i)

Centre = (-2, 3) and radius: $\sqrt{13}$.

linear equation = $2x+y-10=0$ ... (ii)

$y=10-2x$ ... (iii) substitute (iii) into (i)

From (i), $(x+2)^2+(y-3)^2=13$

$(x+2)^2+(10-2x-3)^2=13$.

$\therefore x^2+4x+4+(7-2x)^2=13$

$x^2+4x+4+(7(7-2x)-2x(7-2x))=13$

Simplifying, $x^2+4x+4+(49-14x-14x+4x^2)=13$

$x^2+4x+4+(49-28x+4x^2)=13$.

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

when we solve this, the value of x given an imaginative number i.e $x=\frac{12}{5}+\frac{2\sqrt{14}}{5}i$

This makes it quite impossible to find the points of the circle and the line.

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

Solu.

Given $x^2+25y^2-6xy-16=0$ to be the equation,

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

Given $x-5y-2=0$

$x=5y-2$ ... (ii) substituting.

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

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

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

$20y^2-8y-12=0$ ... solving quadratically.

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