2) Find the equation of the tangent at the point (1,0) on the circle $x^2+y^2-12x-12y+47=0$

Solution

$x^2+y^2-12x-12y+47=0$ —(i)

Equation of line $y-y_1=m(x-x_1)$

$x^2-12x+y^2-12y+47=0$

$(x-6)^2-36+(y-6)^2-36+47=0$

Collect like terms

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

$(x-6)^2+(y-6)^2=25$

∴ The centre $=(6,6)$ and radius $=\sqrt{25}=5$

Let P = Point $(1,0)$ and C = Centre $(6,6)$

Gradient of CP $=\frac{\Delta y}{\Delta x}=\frac{0-6}{1-6}=\frac{-6}{-5}=\frac{6}{5}$

Gradient(m) of CP $=6\times(-5)=-30$

They are perpendicular.

Gradient(m) of CP $=6\times\frac{1}{5}=6/5$

Gradient of tangent $=-5/6$

Equation of Tangent $=y-y_1=(m)(x-x_1)$

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COURSE CODE: MAT 102 (General mathematics II)

Assignment

1) Find the equation of the tangent at the point (1,0) on the circle $x^2+y^2-5x-y+4=0$

Solution

Given $x^2+y^2-5x-y+4=0$ to be equation (i)

Equation of a line $= y-y_1 = m(x-x_1)$

Rearranging equation (i)

$x^2-5x+y^2+y+4=0$

$\left(x-\frac{5}{2}\right)^2-\frac{25}{4}+\left(y-\frac{1}{2}\right)^2-\frac{1}{4}+4=0$

collect like terms

$\left(x-\frac{5}{2}\right)^2+\left(y-\frac{1}{2}\right)^2-\frac{5}{2}=0$

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

Let P, Gradient of CP = $\frac{\Delta y}{\Delta x} = \frac{0-4}{1+(-7)} = \frac{0-4}{1+7} = \frac{-4}{8}$ =

Gradient of CP = $\frac{\Delta y}{\Delta x} = \frac{0-(-7)}{1-4} = \frac{0+7}{-3} = \frac{7}{-3}$

They are perpendicular

The gradient of the tangent = $\frac{3}{7}$

Equation of tangent = $y - y_1 = m(x - x_1)$

$= y - 0 = \frac{3}{7}(x - 1)$

$y = \frac{3}{7}x - \frac{3}{7}$