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MATRIC NUMBER: 19/SCI01/072

MATH 102

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

Solution:

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

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

$(x^2-5x+25/4)-25/4+(y^2-y+1/4)-1/4=-4$.

$(x-5/2)^2+(y-1/2)^2=-4+6.25+0.25$

$(x-5/2)^2+(y-1/2)^2=2.5$.

Center and radius of the circle respectively (5/2, 1/2) and $\sqrt{2.5}$.

$m=\frac{y_2-y_1}{x_2-x_1}=\frac{0-1/2}{1-5/2}=\frac{-1/2}{-3/2}=\frac{2}{6}=\frac{1}{3}$

Gradient of the tangent $m_1 \times m_2=-1$

$1/3 \times m=-1$.

$m=-1 \times 3/1$.

$m=-3$.

Equation of the tangent to the circle $m=-3$ and at point (1, 0).

$y-y_1=m(x-x_1)$

$y-0=-3(x-1)$.

$y=-3x+3$

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

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

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

$(x^2-12x+36)-36+(y^2-12y+36)-36=-47$

$(x-6)^2+(y-6)^2=-47+72$.

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

Gradient of the circle $m_2=\frac{y_2-y_1}{x_2-x_1}$

$=\frac{0-6}{1-6}=\frac{-6}{-5}$

$m_2 = 6/5$

Gradient of the tangent m_1

$m_1 \times m_2 = -1$

$m_1 \times 6/5 = -1$.

$m_1 = -1 \div 6/5$

$m_1 = -1 \times 5/6 = -5/6$.

Equation of tangent to the circle $(1,0)$

$y - y_1 = m(x - x_1)$.

$y - 0 = m(x - 1)$.

$y - 0 = -5/6(x - 1) \Rightarrow y = -5/6x + 5/6$.

3. at point $(1,0)$ on the circle $x^2 + y^2 - 8x + 14y + 40 = 0$.

$x^2 + y^2 - 8x + 14y + 40 = 0$.

$x^2 - 8x + y^2 + 14y = -40$.

$(x^2 - 8x + 16) - 16 + (y^2 + 14y + 49) - 49 = -40$.

$(x^2 - 4)^2 + (y + 7)^2 = 25$.

$(4, -7)$ and $r = \sqrt{25}$

Gradient of the circle $m_2 = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{0 + 7}{1 - 4} = \frac{7}{-3}$

Gradient of the tangent $m_1 = m_1 \times m_2 = -1$

$= m_1 = -1 \times -3/7$.

$m_1 = 3/7$.

Equation of the tangent to the circle at point $(1,0)$.

$y - y_1 = m(x - x_1)$.

$y - 0 = 3/7(x - 1)$.

$y = 3/7x - 3/7$.

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