NAME: AARON ABRAHAM DYEM
DEPARTMENT: COMPUTER ENGINEERING
COURSE: MAT 102
MATRIC NO: 19/Eng02/011

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

Equation of the circle $= (x-a)^2+(y-b)^2=r^2$ using completing the square method:

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

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

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

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

Using $(x-h)^2+(y-k)^2=r^2$,

The centre of the circle is $\left(\frac{5}{2},\frac{1}{2}\right)$ and the radius $=\frac{5}{2}$

Determine the gradient of the radius

$m_r=\frac{y_2-y_1}{x_2-x_1}=\frac{0-\frac{1}{2}}{1-\frac{5}{2}}$

$=-\frac{1}{2}\div-\frac{3}{2}$

$=-\frac{1}{2}\times-\frac{2}{3}$

$=\frac{1}{3}$

Determine the gradient of the tangent

$m_r \times m_t=-1$

$\frac{1}{3}\times m_t=-1$

$\therefore m_t=-3$

To determine the equ equation of the tangent to the circle,

$m_t = -3$ and $(x_1, y_1) = (1,0)$

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

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

$y = -3x + 3$ //

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

Using completing the square

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

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

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

The centre of the circle is $(6,6)$ and the radius $= 25$

To determine the gradient of the radius

$m_r = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 6}{1 - 6}$

$m_r = \frac{-6}{-5} = \frac{6}{5}$

To determine the gradient of the tangent

$m_r \times m_t = -1$

$\frac{6}{5} \times m_t = -1$

$\therefore m_t = -\frac{5}{6}$

To determine the equation of the tangent to the circle,

$m_t = -\frac{5}{6}$ and $(x_1, y_1) = (1,0)$

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

$y - 0 = -\frac{5}{6}(x - 1)$

$y = -\frac{5}{6}x + \frac{5}{6}$ //

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

Using completing the square method;

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

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

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

The centre of the circle $=(4,-7)$ and the radius $=25$

$m_r=\frac{y_2-y_1}{x_2-x_1}=\frac{0+7}{1-4}$

$m_r=-\frac{7}{3}=-\frac{7}{3}$

To determine the gradient of the tangent

$m_r \times m_t=-1$

$-\frac{7}{3}\times m_t=-1$

$m_t=\frac{3}{7}$

To determine the equation of the tangent to the circles,

$m_t=\frac{3}{7}$ and $(x_1,y_1)=$ ~~(0,
(1,0)

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

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

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