JAMES ONYEKACHI NATHANIEL

MAT 102 MECHATRONICS ENGINEERING

① Find the equation of the tangent at point (1,0) on the circle

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

Soln @ $x=1 \quad y=0$

$\frac{dy}{dx}$: $2x + 2y\frac{dy}{dx} - 5 - \frac{dy}{dx} = 0$

$2x-5 = -2y\frac{dy}{dx}\frac{dy}{dx}$

$2x-5 = \frac{dy}{dx}(-2y+1)$

$\frac{2x-5}{-2y+1} = \frac{dy}{dx}$

$\frac{2(1)-5}{0+1} = \frac{dy}{dx}$

$\frac{dy}{dx} = -3 = m$

$y = mx+c$; $y = -3x+c$

$0 = -3(1)+c$

$c = 3$

∴ Equation of tangent: $y = -3x+3$

② $x^2+y^2-12x-12y+47=0$ @ (1,0)

$2x + 2y\frac{dy}{dx} - 12 - 12\frac{dy}{dx} = 0$

$\frac{2x-12}{-(2y-12)} = \frac{dy}{dx} = m$

$\frac{2-12}{-(-12)} = m$

$\frac{-10}{12} = m$

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

$y = mx+c$

$0 = -\frac{5}{6}(1)+c$

$c = \frac{5}{6}$

$y = \frac{-5}{6}x + \frac{5}{6}$ (4)

or $6y = -5x+5$

(3) $x^2+y^2-8x+14y+40=0$ @ $(1,0)$

$$2x+2y\frac{dy}{dx}-8+14\frac{dy}{dx}+0=0$$

$$\frac{2x-8}{-(2y+14)}=\frac{dy}{dx}$$

$$\frac{8-2x}{2y+14}=\frac{dy}{dx}$$

$$\frac{6}{14}=\frac{dy}{dx}$$

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

$$y=\frac{3}{7}x+c$$

$$0=\frac{3}{7}(1)+c$$

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

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