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DEPARTMENT: BIOMEDICAL ENGINEERING

COURSE CODE: ENGG 281

COURSE TITLE: ENGINEERING MATHEMATICS 1

ASSIGNMENT

$$5x^2 + y^2 = 5 \quad \text{--- (1)}$$

$$x^2 + y^2 = 4 \quad \text{--- (2)}$$

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

from eqn (2) make y^2 the subject of formula

$$y^2 = 4 - x^2 \quad \text{--- (3)}$$

Put eqn (3) into (1)

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

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

$$4x^2 - 1 = 0$$

$$4x^2 = 1$$

$$x^2 = \frac{1}{4}$$

$$x = \pm \sqrt{\frac{1}{4}}$$

$$x = \pm \frac{1}{2}$$

Putting $\frac{1}{2}$ into eqn (2)

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

$$\frac{1}{4} + y^2 = 4$$

$$y^2 = 4 - \frac{1}{4}$$

$$y^2 = 3.75$$

$$y = \sqrt{3.75}$$

$$y = 1.936$$

For eqn (1)

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

$$10x + 2y \frac{dy}{dx} = 0$$

$$2y \frac{dy}{dx} = -10x$$

$$\therefore x = \pm 0.5, y = 1.936$$

(4)

$$\therefore \frac{dy}{dx} = \frac{-5x}{4}$$

Put the values of x and y into eqn. (4)

$$z = -5(0.5) = -1.2913$$

1.936

$$\tan \theta = -1.2913$$

$$\therefore \theta = \tan^{-1}(-1.2913)$$

$$\theta = -52.25^\circ$$

For eqn (2)

$$\frac{dy}{dx} = x^2 + y = 4$$

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

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

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

Put the values of x and y into eqn. (5)

$$\frac{dy}{dx} = \frac{-0.5}{1.936} = -0.2583$$

$$\tan \theta = -0.2583$$

$$\theta = \tan^{-1}(-0.2583)$$

$$\theta = -14.48^\circ$$

\therefore The total angle, θ_T

$$\theta_T = \theta_2 - \theta_1$$

$$\begin{aligned} \theta_T &= -14.48 - (-52.25) \\ &= -14.48 + 52.25 \\ \theta_T &= 38.02^\circ \end{aligned}$$

$$f(x) := \sqrt{5 - 5x^2}$$

$$g(x) := \sqrt{4 - x^2}$$

