

Computer Engineering 18/EENG1001/025

Mathematics Assignment ENG251

- By plotting the curves given in equations 1 and 2 to show the area between them and their points of intersections with the aid of Maths CAS. Find the magnitude of the of which x and y are positive.

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

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

Solution:

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

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

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

Substitute y^2 into eqn (i).

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

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

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

$$4x^2 = 1$$

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

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

Using $x = \frac{1}{2}$, and we use the positive,

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

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

$$y^2 = \frac{15}{4}$$

$$y = \sqrt{\frac{15}{4}}$$

$$y = 1.936$$

Differentiating equation (i)

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

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

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

$$\frac{dy}{dx} = -5 \left(\frac{1}{y} \right)$$

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

$$\tan \theta_1 = \frac{dy}{dx}$$

$$\theta_1 = \tan^{-1}$$

$$\theta_1 = -52$$

Differentiating

$$2x + 2y$$

$$\frac{dy}{dx}$$

$$\frac{dy}{dx}$$

$$\frac{dy}{dx}$$

$$\theta_2 = \tan^{-1}$$

$$\theta_2 = -10$$

\therefore the to

$$= \theta_2 -$$

$$= -14$$

$$=$$

$$\frac{dy}{dx} = \frac{-5(\frac{1}{2})}{1.936}$$

$$\frac{dy}{dx} = -1.2913.$$

$$\tan \theta_1 = \frac{dy}{dx}.$$

$$\theta_1 = \tan^{-1} -1.2913.$$

$$\theta_1 = -52.25^\circ$$

Differentiating equation (ii)

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

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

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

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

$$\theta_2 = \tan^{-1} \frac{dy}{dx}$$

$$\theta_2 = -14.48^\circ$$

\therefore the total angle.

$$= \theta_2 - \theta_1$$

$$= -14.48 - (-52.25^\circ)$$

$$= 38.02^\circ$$

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

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

