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18/MHS01/116
ENQ 281 Assignment
Elect / Elett Engineering.

$$x^2 + y^2 = 4 \dots (i)$$

$$9x^2 + y^2 = 4 \dots (ii)$$

Solution

$$y^2 = 5(1-x^2) \dots (iii)$$

Substitute for y^2 in equation (i)

$$x^2 + 5(1-x^2) = 4$$

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

$$x^2 - 5x^2 = -1 \quad , \quad -4x^2 = -1$$

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

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

Substitute $x = \frac{1}{2}$ into equation (i)

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

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

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

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

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

2

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

Differentiate using implicit differentiation.

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

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

$$\frac{dy}{dx} = \frac{-10 \left(\frac{1}{2}\right)}{2 \left(\sqrt{\frac{15}{4}}\right)}$$

$$\frac{dy}{dx} = \frac{-5}{\sqrt{15}}, \quad \frac{dy}{dx} = \tan \theta$$

$$\theta = \tan^{-1} \left(\frac{-5}{\sqrt{15}} \right)$$

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$$\theta = -52.24$$

Substitute x into equation (ii)

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

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

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

$$y^2 = 16 - \frac{1}{4} = y = \sqrt{\frac{15}{4}} = \underline{\underline{1.9365}}$$

3) $x^2 + y^2 = 4$

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

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

$$= \frac{-2 \left(\frac{1}{2}\right)}{2 \left(\sqrt{15}\right)}$$

$$\frac{dy}{dx} = \frac{1}{15}$$

$$\theta_2 = \tan^{-1} \left(\frac{1}{\sqrt{15}} \right) = \underline{\underline{-14.48}}$$

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

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

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

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