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ENG Mathematics Assignment 2

$y^2 = 5(1-x^2) \dots (1)$ Why not the point of intersection $(-0.5, 1.97)$, $(0.5, 1.92)$

$$2x \frac{dy}{dx} = + \dots (1)$$

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

Sub for y^2 in eqn (1)

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

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

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

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

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

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

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

differentiating implicitly,

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

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

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

$$y^2 = \sqrt{5(1-x^2)}$$

$$= \sqrt{\frac{5}{2}}$$

$$x = \frac{1}{2} \text{ and } y = \sqrt{\frac{5}{2}}$$

$$\frac{dy}{dx} = \frac{-10(\frac{1}{2})}{2(\sqrt{\frac{5}{2}})}$$

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

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

$$\theta = \tan^{-1} \left(\frac{-5}{\sqrt{5}} \right) = -52.24^\circ$$

Substituting x in eqn (1)

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

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

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

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

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

differentiating ~~implicitly~~ implicitly,

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

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

$$\therefore \frac{-x}{y} \left(\frac{1}{x} \right)$$

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

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

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

$$\theta_2 = -14.48$$

