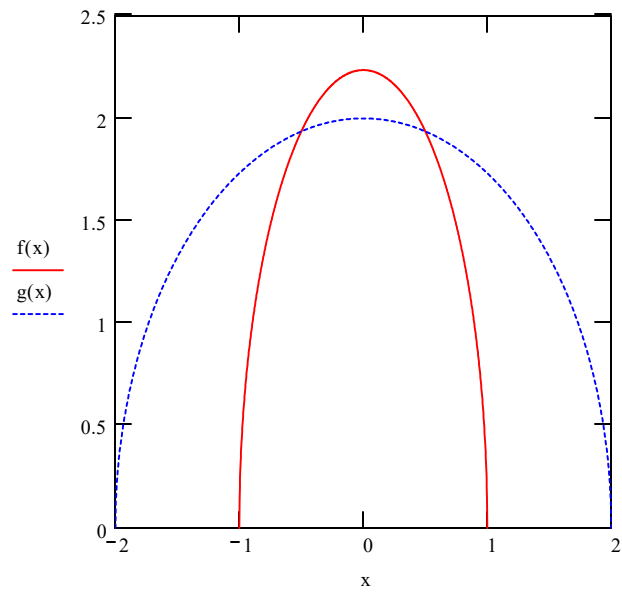


$$g(x) := \sqrt{4 - x^2}$$

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



$$5x^2 + y^2 = 8 \quad (i)$$

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

Solve it simultaneously

$$1 \times 5x^2 + y^2 = 8$$

$$1 \times x^2 + y^2 = 4$$

$$5x^2 + y^2 = 8$$

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

$$4x^2 = 4$$

$$x^2 = 1$$

$$x = \pm 1$$

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

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

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

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

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

$$y^2 = 3\frac{3}{4}$$

$$y = \pm \sqrt{3\frac{3}{4}} = \pm \frac{\sqrt{15}}{2}$$

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

Differentiate equation (i)

$$5x + 2y = 0$$

$$8 \ln \theta + 2y \frac{dy}{dx} = 0$$

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

Solve $x = \frac{1}{2}$ or $y = \pm \frac{\sqrt{15}}{2}$

$$\frac{dy}{dx} = \frac{-5(\frac{1}{2})}{\pm \frac{\sqrt{15}}{2}} = -1.291$$

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

$$\theta_1 = \ln^{-1} \frac{dy}{dx}$$

$$\theta_1 = \ln^{-1} (-1.291) = -52.239$$

Differentiate equation (ii)

$$2x + 2y = 0$$

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

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

$$= -\frac{\frac{1}{2}}{\pm \frac{\sqrt{15}}{2}} = -0.277$$

$$\ln \theta_2 = \frac{dy}{dx}$$

$$\theta_2 = \ln^{-1} (-0.277) = -10.4775$$

$$\theta_2 \theta_1 = -52.239 \times -10.4775$$

$$= 547.239 + 10.4775$$

\approx

$$x^2 + y^2 = 5 \quad (i)$$

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

Solve it simultaneously

$$1 \times 5x^2 + y^2 = 5$$

$$1 \times x^2 + y^2 = 4$$

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

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

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

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

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

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

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

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

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

$$y^2 = 3\frac{3}{4}$$

$$y = \pm \sqrt{3\frac{3}{4}} = \frac{\sqrt{15}}{2}$$

$$\frac{dy}{dx} = 0$$

Differentiate equation (i)

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

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

$$\frac{dy}{dx} = -\frac{4x}{y}$$

Value of $\frac{dy}{dx}$ at $(\frac{1}{2}, \frac{\sqrt{15}}{2})$

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

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

$$\theta_1 = \tan^{-1} \frac{dy}{dx}$$

$$\theta_1 = \tan^{-1} \left(-\frac{4}{\sqrt{15}}\right) = -52.239^\circ$$

Differentiate equation (ii)

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

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

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

$$\frac{dy}{dx} = -\frac{x}{y} = -\frac{\frac{1}{2}}{\frac{\sqrt{15}}{2}} = -\frac{1}{\sqrt{15}}$$

$$\frac{dy}{dx} \tan \theta_2 = \frac{dy}{dx}$$

$$\theta_2 = \tan^{-1} \left(-\frac{1}{\sqrt{15}}\right) = -10.677^\circ$$

$$\theta_2 - \theta_1 = -10.677^\circ - (-52.239^\circ) = 41.562^\circ$$

$$= -10.677^\circ + 52.239^\circ = 41.562^\circ$$

$$|\theta_2 - \theta_1| = 31.7615^\circ$$

$$\approx 32^\circ$$