08/10/19 ENG 281 ASSIGNMENT

18/ENG02/1068

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Computer Engineering

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

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

Subtracting (2) from (1)

$4x^2 = 1$

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

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

substituting x in eqn (2)

$x^2 + y^2 = 4$

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

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

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

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

$y = \frac{\sqrt{15}}{2} / 1.9365$

Co-ordinates of point of intersection:

$(\frac{1}{2}, \frac{\sqrt{15}}{2})$ $(0.5, 1.9365$

To plot the graph we make y the subject of the formula for both equations

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

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

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

$x^2 + y^2 = 4$

$\sqrt{y^2} = \sqrt{4 - x^2}$

$y = \sqrt{4 - x^2}$

Angles of intersection

Angle 1 (θ_1)

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

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

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

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

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

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

Substituting x & y

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

$= -1.2910$

$\frac{dy}{dx} = \tan\theta = -1.2910$

$\theta_1 = \tan^{-1}(-1.2910)$

$\theta_1 = -52.24°$

Angle 2 (θ_2)

$x^2 + y^2 = 4$

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

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

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

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

Substitute x and y

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

$$\frac{dy}{dx} = -0.0645 - 0.2582$$

$$\therefore \tan\theta_2 = -0.0645 - 0.2582$$

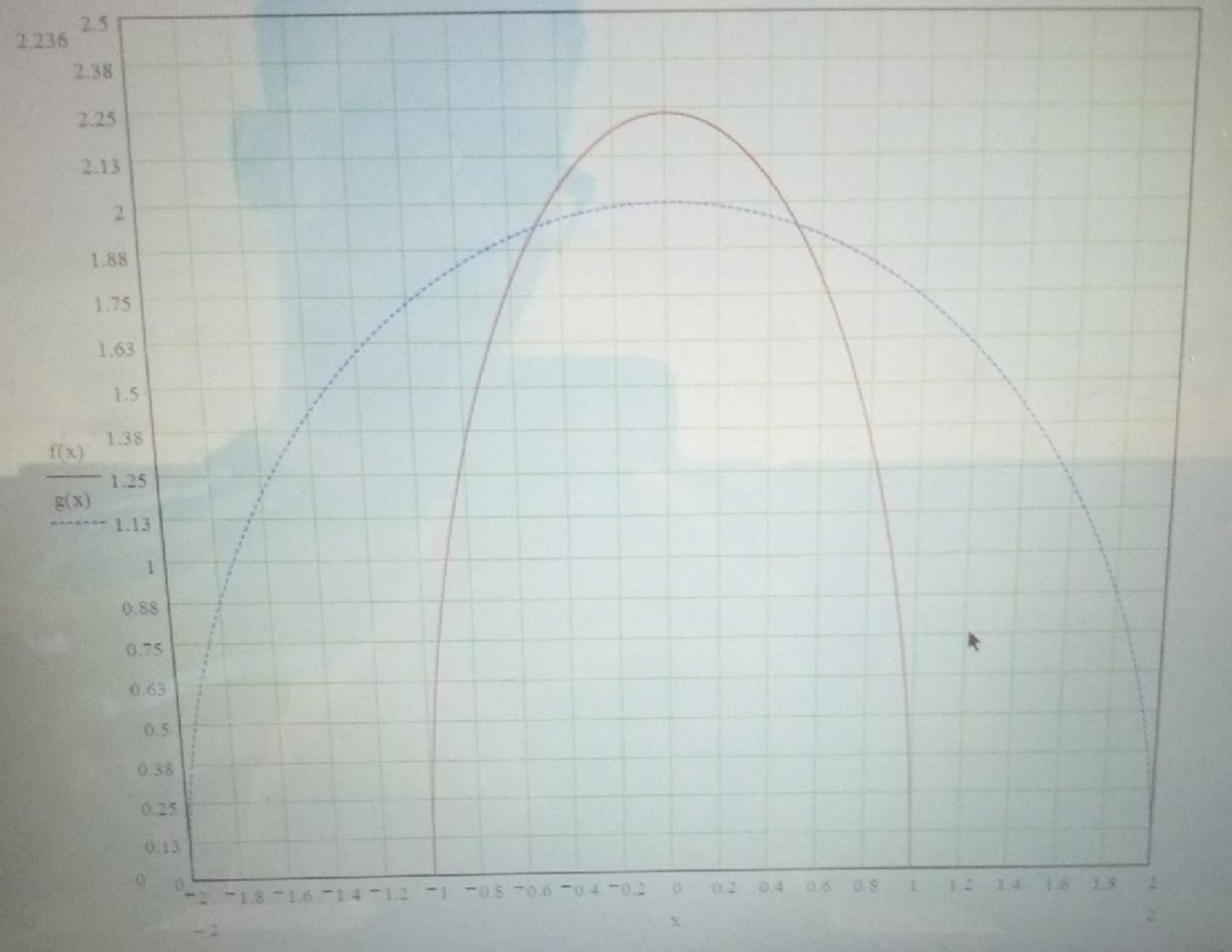
$$\theta_2 = \tan^{-1}(-0.0645)\ (-0.2582)$$

$$\theta_2 = 3.64^\circ \quad -14.48^\circ$$

$$\theta = \theta_2 - \theta_1$$

$$= -14.48 - (-52.24)$$

$$= 37.76^\circ$$


2.236
2.5
2.38
2.25
2.13
2
1.88
1.75
1.63
1.5
1.38
1.25
1.13
1
0.88
0.75
0.63
0.5
0.38
0.25
0.13
0
f(x)
g(x)
−2
−1.8
−1.6
−1.4
−1.2
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
x