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CHEMICAL ENGINEERING
ENG 281

$y^2 = 5(1-x^2)$ ....(i) using point of intersection (0.5, 1.97), (0.5, 1.93).

$x^2 + y^2 = 4$ ...(ii)

$y^2 = 5(1-x^2)$ ....(i)

Substitute for y^2 in eqn (ii)

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

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

$-4x^2 = 4 - 5$

$-4x^2 = -1$

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

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

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

differentiating implicitly

$10x + 2y\,dy/dx = 0$

$2y\,dy/dx = -10x$

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

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

$= \sqrt{15}/2$

$x = 1/2$ and $y = \sqrt{15}/2$

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

$dy/dx = -5/15$

$dy/dx = \tan\theta$

$\theta = \tan^{-1}(-5/\sqrt{15}) = -52.24°$

Substituting x in eqn (ii)

$(1/2)^2 + y^2 = 4$

$1/4 + y^2 = 4$

$y^2 = 4 - 1/4$

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

$x^2 + y^2 = 4$

differentiating implicitly,

$2x + 2y\,dy/dx = 0$

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

$\therefore \frac{-x(1/2)}{x(\sqrt{15}/2)}$

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

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

$\theta_2 = \tan^{-1}(-1/\sqrt{15})$

$= -14.48°$


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
−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