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Course: - Chemical Engineering
Dept: A

Course: - ENG 281

Maths Assignment.

$$y = \sin t - t \cos t$$

$$x = \cos t + t \sin t$$

$$\frac{dy}{dx} = \cos t - (-t \sin t + \cos t)$$

$$= \cos t + t \sin t - \cos t$$

$$= \cos t - \cos t + t \sin t$$

$$\frac{dy}{dx} = t \sin t //$$

$$\frac{dx}{dt} = -\sin t + (t \cos t + \sin t)$$

$$= -\sin t + t \cos t + \sin t$$

$$= t \cos t - \sin t + \sin t$$

$$\frac{dx}{dt} = t \cos t$$

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

$$\frac{d^2y}{dx^2} = \frac{d}{dt} (t \tan t) \times \frac{dt}{dx}$$

$$\frac{d^2y}{dx^2} = -t^{-1} \sec^3 t$$

$$R = \frac{(1 + (\frac{dy}{dx})^2)^{3/2}}{d^2y/dx^2} = \frac{(1 + (t \tan t)^2)^{3/2}}{t^{-1} \sec^3 t}$$

$$R = \frac{(1 + \tan^2 t)^{3/2}}{t^{-1} \sec^3 t}$$

$$R = \frac{(\sec t)^{2 \times 3/2}}{t^{-1} \sec^3 t}$$

$$R = \frac{(\sec t)^3}{t^{-1} (\sec t)^3} = t^{-1} = t \text{ Units}$$

Centre of Curvature

$$x_1 = h + R \sin \theta$$

$$h = x_1 - R \sin \theta$$

$$k = y_1 + R \cos \theta$$

$$\theta = \tan^{-1} \left(\frac{dy}{dx} \right)$$

$$\theta = \tan^{-1} (\tan t)$$

$$\theta = t$$

$$x_1 = \cos t + t \sin t$$

$$h = \cos t + t \sin t - (t) \sin t$$

$$h = \cos t + t \sin t - t \sin t$$

$$h = \cos t$$

$$k = y_1 + R \cos \theta$$

$$y_1 = \sin t - t \cos t$$

$$k = \sin t - t \cos t + (t) \cos t$$

$$k = \sin t - t \cos t + t \cos t$$

$$k = \sin t$$

Centre of curvature = $(\cos t, \sin t)$,