

Name: Thank God Clinton.

Course: ENEG 281

Department: Mechanical Engineering.

Matric No.: 16/ENGD06/068

(1)

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

Q1) An expression for the radius of curvature (R) in terms of t
answer

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

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

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

$$\frac{dy}{dt} = \cos t + t \sin t - \cos t = t \sin t.$$

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

$$= \frac{t \sin t}{t \cos t}$$

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

$$\frac{d^2 y}{dx^2} = u = \sin t \quad v = \cos t$$

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

$$\frac{dv}{dt} = -\sin t$$

$$\frac{v \frac{du}{dt} - u \frac{dv}{dt}}{v^2}$$

$$\frac{\cos t (\cos t) - (\sin t)(-\sin t)}{(\cos t)^2} \times \frac{1}{t \cos t}$$

$$\frac{\cos^2 t + \sin^2 t}{\cos^2 t} \times \frac{1}{t \cos t}$$