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Elect/Elect

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$$1. \quad x = \cos t + t \sin t$$

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

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

$$\frac{dt}{dx} = \frac{1}{t \cos t}$$

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

$$\frac{dy}{dt} = t \sin t$$

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

$$= t \sin t \cdot \frac{1}{t \cos t}$$

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

$$\frac{d^2y}{dx^2} = \sec^2 t \cdot \frac{dt}{dx}$$

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

$$\text{radius of curvature} = \frac{[1 + \left(\frac{dy}{dx}\right)^2]^{3/2}}{d^2y/dx^2}$$

$$= \frac{[1 + \tan^2 t]^{3/2}}{\sec^3 t / t \cos t}$$

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

$$R = \sec^3 t \times \frac{\sec t}{\sec^2 t}$$

$$\sec t \times \frac{\sec t}{\sec^2 t}$$

$$= \frac{1}{\sec t} \cdot \sec t$$

$$R = 1$$

2.) $h = x_1 - R \cos t$

$$k = y_1 + R \sin t$$

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

$$h = \cos t$$

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

$$k = \sin t$$

∴ Coordinates (cos t, sin t)