AJAMAH ILMI JEGANIAH IKENGOSOOT

$x = \cos t + t\sin t$ ..... ①

$y = \sin t - t\cos t$ ..... ②

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

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

$$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dt} = \frac{t\sin t}{t\cos t} = \tan t$$

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

(i) $$R = \frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]}{\left(\frac{d^2y}{dx^2}\right)} = \frac{\left[1 + (\tan t)^2\right]^{3/2}}{\sec^2 t}$$

(ii) $h = x - R\sin\theta$

$k = y + R\cos\theta$

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

$$\theta = \tan^{-1}\left[\frac{dy}{dx}\right]$$

From eqn ① $x = \cos t + t\sin t$

from eqn ② $y = \sin t - t\cos t$

from question (i) $R = \frac{\left[1 + (\tan t)^2\right]^{3/2}}{\sec^2 t}$

So $h = (\cos t + t\sin t) - \left(\frac{(1+(\tan t)^2)^{3/2}}{\sec^2 t}\right) \sin\left(\tan^{-1}(\tan t)\right)$

$x = (\sin t - t\cos t) + \left(\frac{(1+(\tan t)^2)^{3/2}}{\sec^2 t}\right) \cos\left(\tan^{-1}(\tan t)\right)$