Faith Pau

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

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

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

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

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

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

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

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

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

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

Faith Paul

$$\frac{d^2y}{dx} = \frac{d}{dx}\frac{dy}{dx} = \frac{d}{dx}\frac{dt}{dt} - \frac{dy}{dx}$$

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

$$= \sec^2 t \times \frac{1}{t\cos t}$$

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

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

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

If $\theta = \tan^{-1}(dy/dx)_p$

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

$h = x_1 - R\sin\theta$

$$h = x_1 - \left\{\frac{\left[(1 + \tan^2 t)^{3/2} t\cos t\right]}{\sec^2 t} \sin\left[\tan^{-1}(\tan t)\right]\right\}$$

$$k = y_1 - \left\{\frac{\left[(1 + \tan^2 t)^{3/2} t\cos t\right]}{\sec^2 t} \sin\left[\tan^{-1}(\tan t)\right]\right\}$$