

NAME: AYEDMERETSE ENDRITSE M TOMERE  
MATHS NUMBER: 16/ENGR05/014  
DEPARTMENT: MECHATRONICS ENGINEERING  
COURSE CODE: ENGR 251

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

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

Soln

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

$$\text{let } u = t \sin t$$

$$u = t, \frac{du}{dt} = 1$$

$$v = \sin t, \frac{dv}{dt} = \cos t$$

using product rule:  $(u \frac{dv}{dt} + v \frac{du}{dt})$

$$= t \cos t + \sin t \times 1$$

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

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

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

$$x = t \cos t$$

$$u = t, \frac{du}{dt} = 1$$

$$v = \cos t, \frac{dv}{dt} = -\sin t$$

using product rule:  $(u \frac{dv}{dt} + v \frac{du}{dt})$

$$= t \times -\sin t + \cos t \times 1$$

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

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

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

$$= t \sin t$$

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

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