

10.2

$$\begin{aligned} 43c) \quad x &= 5 \cos(\pi t/6) \\ y &= 3 \sin(\pi t/6) \end{aligned}$$

$$\frac{x}{5} = \cos(\pi t/6)$$

$$\frac{y}{3} = \sin(\pi t/6)$$

$$\begin{aligned} \sin^2 \theta + \cos^2 \theta &= 1 \\ \sin^2(\pi t/6) + \cos^2(\pi t/6) &= 1 \end{aligned}$$

$$\left(\frac{y}{3}\right)^2 + \left(\frac{x}{5}\right)^2 = 1$$

$$\frac{x^2}{25} + \frac{y^2}{9} = 1$$

$$47) \quad x = e^t \sin t, \quad y = e^t \cos t$$

$$(a) \quad \frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{e^t \cos t - e^t \sin t}{e^t \sin t + e^t \cos t}$$

$$\begin{aligned} \frac{dy}{dx} \left(\frac{\pi}{2} \right) &= \frac{e^{\pi/2} \cos \frac{\pi}{2} - e^{\pi/2} \sin \frac{\pi}{2}}{e^{\pi/2} \sin \frac{\pi}{2} + e^{\pi/2} \cos \frac{\pi}{2}} \\ &= \frac{-e^{\pi/2}}{e^{\pi/2}} = -1 \end{aligned}$$

$$(b) \quad \sqrt{(e^t \sin t + e^t \cos t)^2 + (e^t \cos t - e^t \sin t)^2} = 3.844$$

$$(c) \quad \int_0^1 \sqrt{(e^t \sin t + e^t \cos t)^2 + (e^t \cos t - e^t \sin t)^2} = 2.430$$