

## Practice 4.2: Calculus on Parametrics

Find  $\frac{dy}{dx}$ .

1)  $x = t^2, \quad y = 5 - 4t$

2)  $x = \sin^2 \theta, \quad y = \cos^2 \theta$

Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$ , and find the slope and concavity (if possible) at the given value of the parameter.Parametric EquationsPoint

3)  $x = 2t, \quad y = 3t - 1$

$t = 3$

4)  $x = t + 1, \quad y = t^2 + 3t$

$t = -1$

5)  $x = 2 \cos \theta, \quad y = 2 \sin \theta$

$\theta = \frac{\pi}{4}$

6)  $x = 2 + \sec \theta, \quad y = 1 + 2 \tan \theta$

$\theta = \frac{\pi}{6}$

7)  $x = \cos^3 \theta, \quad y = \sin^3 \theta$

$\theta = \frac{\pi}{4}$

8) Find all points (if any) of horizontal and vertical tangency to the curve  $x = t^3 - 3t, \quad y = 3t^2 - 9$ .

Find the arc length of the curve on the given interval.

Parametric EquationsInterval

9)  $x = t^2, \quad y = 2t$

$0 \leq t \leq 2$

10)  $x = e^{-t} \cos t, \quad y = e^{-t} \sin t$

$0 \leq t \leq \frac{\pi}{2}$