10.1 - Curves Defined by Parametric Equations

Preparation (Watch at Home)

10.1a

Typical forms of parametric equations

$x = f(t), y = g(t)$

OR $x = f(\theta), y = g(\theta)$

Exercises:

(a) Sketch the curve by using the parametric equations to plot points. Indicate with an arrow the direction in which the curve is traced as t increases.
(b) Eliminate the parameter to find a Cartesian equation of the curve.

$x = 3t + 2, y = 2t + 3$

$x = t^2, y = 1 - t$

10.1b

Exercises:

(a) Eliminate the parameter to find a Cartesian equation of the curve.
(b) Sketch the curve and indicate with an arrow the direction in which the curve is traced as the parameter increases.

$x = \sqrt{t+1}, y = \sqrt{t-1}$

$x = \tan^2 \theta, y = \sec \theta, -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$

In-Class Discussion

10.1c

Parametric equations of a cycloid

$x = r(\theta - \sin\theta)$, $y = r(1 - \cos\theta)$

In-Class Practice

1. a) Sketch the curve by using the parametric equations to plot points. Indicate with an arrow the direction in which the curve is traced as t increases.

b) Eliminate the parameter to find a Cartesian equation of the curve

$x = \sin t$, $y = 1 - \cos t$, $0 \leq t \leq 2\pi$

2. a) Eliminate the parameter to find a Cartesian equation of the curve.

b) Sketch the curve and indicate with an arrow the direction in which the curve is traced as the parameter increases.

$x = e^t, y = e^{-2t}$

3. Describe the motion of a particle with position (x, y) as t varies in the given interval.

$x = 2 + \sin t, y = 1 + 3\cos t, \frac{\pi}{2} \leq t \leq 2\pi$

4. Compare the curves represented by the parametric equations. How do they differ?

a) $x = t,\ y = t^{-2}$

b) $x = \cos t,\ y = \sec^2 t$

c) $x = e^t,\ y = e^{-2t}$