

## 1.7 Curves Defined by Parametric Equations

**A** [Click here for answers.](#)

### 1–15

- (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.

1.  $x = 2t + 4, \quad y = t - 1$

2.  $x = 3 - t, \quad y = 2t - 3, \quad -1 \leq t \leq 4$

3.  $x = 1 - 2t, \quad y = t^2 + 4, \quad 0 \leq t \leq 3$

4.  $x = t^2, \quad y = 6 - 3t$

5.  $x = 1 - t, \quad y = 2 + 3t$

6.  $x = 2t - 1, \quad y = 2 - t, \quad -3 \leq t \leq 3$

7.  $x = 3t^2, \quad y = 2 + 5t, \quad 0 \leq t \leq 2$

8.  $x = 2t - 1, \quad y = t^2 - 1$

9.  $x = 3 \cos \theta, \quad y = 2 \sin \theta, \quad 0 \leq \theta \leq 2\pi$

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

11.  $x = e^t, \quad y = \sqrt{t}, \quad 0 \leq t \leq 1$

12.  $x = e^t, \quad y = e^t$

13.  $x = \cos^2 t, \quad y = \cos^4 t$

14.  $x = \frac{1 - t^2}{1 + t^2}, \quad y = \frac{2t}{1 + t^2}$

15.  $x = \frac{1 - t}{1 + t}, \quad y = t^2, \quad 0 \leq t \leq 1$

**S** [Click here for solutions.](#)

### 16–19

- (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.

16.  $x = 2 \cos \theta, \quad y = \frac{1}{2} \sin \theta, \quad 0 \leq \theta \leq 2\pi$

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

18.  $x = \tan \theta + \sec \theta, \quad y = \tan \theta - \sec \theta, \quad -\pi/2 < \theta < \pi/2$

19.  $x = \cos t, \quad y = \cos 2t$

- 20–23** Describe the motion of a particle with position  $(x, y)$  as  $t$  varies in the given interval.

20.  $x = 4 - 4t, \quad y = 2t + 5, \quad 0 \leq t \leq 2$

21.  $x = \tan t, \quad y = \cot t, \quad \pi/6 \leq t \leq \pi/3$

22.  $x = 8t - 3, \quad y = 2 - t, \quad 0 \leq t \leq 1$

23.  $x = \sin t, \quad y = \csc t, \quad \pi/6 \leq t \leq 1$

- 24–26** Graph  $x$  and  $y$  as functions of  $t$  and observe how  $x$  and  $y$  increase or decrease as  $t$  increases. Use these observations to make a rough sketch by hand of the parametric curve. Then use a graphing device to check your sketch.

24.  $x = 3(t^2 - 3), \quad y = t^3 - 3t$

25.  $x = \cos t, \quad y = \tan^{-1} t$

26.  $x = t^4 - 1, \quad y = t^3 + 1$









