

1. Graph BY HAND the following sets of parametric equations using your calculator to check.

$$a. \begin{cases} x = 4 - 2t \\ y = 3 + 6t - 4t^2 \end{cases} \quad -4 \leq t \leq 4$$

$$b. \begin{cases} x = \sqrt{t+1} \\ y = \frac{1}{t+1} \end{cases} \quad 0 \leq t \leq 8$$

$$c. \begin{cases} x = 3 \sin\left(\frac{t}{2}\right) \\ y = 4 \cos\left(\frac{t}{2}\right) \end{cases} \quad 0 \leq t \leq 2\pi$$

$$d. \begin{cases} x = t^3 \\ y = 2^t \end{cases} \quad t \in [-3, 3]$$

2. a. Find a rectangular equation by eliminating the parameter for all of the equations in #1.
b. Sketch the graphs of the rectangular equations. How do the graphs differ from those in #1.

3. Find a set of parametric equations for the given rectangular equations. Let $t = x + 2$ be your parameter.

$$a. y = 3x - 2$$

$$b. y = x^2$$

$$c. x = y^{\frac{5}{4}}$$

4. Write a set of parametric equations for a circle which has a diameter with endpoints $(-2, 4)$ and $(3, -8)$ and a domain such that only a quarter of the circle is traced out.

5. Write a set of parametric equations for an ellipse which has a minor axis length 16 and foci at $(0, 9)$ and $(0, -9)$.

6. The transverse axis has endpoints $(3, 7)$ and $(3, -3)$ and the conjugate axis has length 16. Write a set of parametric equations for this conic section.

7. Write a set of parametric equations for the line through the points $(-2, 7)$ and $(3, 22)$ given the parameter $t = 2x - 1$

8. Write a set of parametric equations for each of the following.

a. $\frac{(x+3)^2}{64} + \frac{(y-2)^2}{20} = 1$

b. $(x-1)^2 + (y)^2 = 36$

c. $\frac{(x+3)^2}{16} - \frac{(y-2)^2}{25} = 1$

d. $\frac{(y+2)^2}{100} - \frac{(x-7)^2}{121} = 1$

9. Eliminate the parameter in each of the following.

a. $\begin{cases} x = \sqrt{29} \cos(t) \\ y = 6 \sin(t) - 2 \end{cases}$

b. $\begin{cases} x = 5 \tan(t) - 3 \\ y = 8 \sec(t) - 1 \end{cases}$

c. $\begin{cases} x = 5 \csc(t) + 2 \\ y = \cot(t) - 3 \end{cases}$

10. A person goes up an escalator with a horizontal speed of 1 ft/s and a vertical speed of 2 ft/s.

a. Find a set of parametric equations for the motion of the person.

b. Describe the location of the person at $t = 7$ seconds. _____

11. From his starting point, a biker rides along a straight path. His speed to the north is 2 mi/h. Her speed to the east is 1.4 mi/h. Let x represent how far east of her starting point the hiker is, and let y represent how far north she is.

a. Find a set of parametric equations for his motion. $\begin{cases} x = \\ y = \end{cases}$

b. Write an equation in x and y only (rectangular) for his motion. _____

c. Find the location of the biker 90 minutes into his trip. _____