

11-R Parametric Equations

Review

1. **Graphing Parametric Equations:** Graph the following parametric equations for the given domain of t (*label starting point and arrows for orientation*). Then, transform into Cartesian equations and state domain & range.

a. $x = 2t$
 $y = -t + 4$
 $t \in (-1, 3]$

b. $x = -2t$
 $y = -t^2$
 $t \in [-2, 2]$

c. $x = t^2$
 $y = 2t - 2$
 $t \leq -1$ or $t \geq 1$

d. $x = \sqrt{t}$
 $y = t - 1$
 $t \in \{0, 1, 4, 9\}$

2. Given the rectangular equation and the parameter, provide a set of parametric equations

a. $y = 3x^2 + 4x - 2$
Parameter: $t = 2x$

b. $y = -2x + 3$
Parameter: $t = x + 1$

3. A butterfly flies into the air from the top of a 6-inch flower with a horizontal speed of 0.8 ft/sec and vertical speed 0.6 ft/sec.

- Write a set of parametric equations for the location of the butterfly:
- What is the altitude of the butterfly after 40 seconds?
- How long would it take her to fly directly above another flower that is 12 feet away?

4. a. Write a set of parametric equations for circle whose center is (4, 3) with a radius of 5 and rotates clockwise.

b. An ellipse with vertices (2, 10) & (2, 0) and minor axis length 6.

d. A parabola that opens to the right that has a vertex at (5, -2)

5. For each problem, a. State what type of conic it is and its direction b. Sketch including orientation c. Give the equation in rectangular form d. state domain and range.

$$\begin{cases} x = 5\cos(t) - 2 \\ y = 6\sin(t) \end{cases}$$

$$\begin{cases} x = 3 - 2\sin(-t) \\ y = 2\cos(t) - 5 \end{cases}$$

$$\begin{cases} x = 4\sec(t) \\ y = 3\tan(t) - 1 \end{cases}$$

6. For each problem, a. State what type of conic it is, and its direction b. Sketch including orientation c. give ^{the} equation in parametric form ~~(if it's a circle or ellipse, state orientation)~~ d. state domain and range.

$$\frac{(x-5)^2}{16} + \frac{(y+2)^2}{18} = 1$$

$$\frac{(y+6)^2}{16} - \frac{(x+9)^2}{25} = 1$$

$$x^2 + y^2 - 4x + 6y - 12 = 0$$

7. Make sure you can limit the domain of t for conics, too!