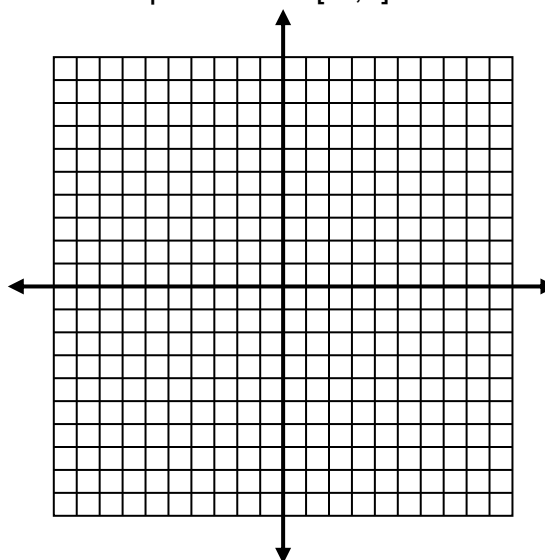


1. Fill in the table, plot the points, and sketch the parametric equation for $t \in [-2, 6]$

$$x = \sqrt{t^2 + 1}$$

$$y = 2 - t$$

t	x	y
-2		
-1		
0		
1		
2		
3		
4		
5		
6		



Problems 2 – 10: Eliminate the parameter to write the parametric equations as a rectangular equation. Check your work by first graphing the parametric equations (on your calculator) than graphing the Cartesian equations (also on your calculator) to see if they match. (Note: If you graph faster by hand – go for it)

2. $x = \frac{1}{t-2}$
 $y = 4t + 5$

3. $x = 6 - t$
 $y = \sqrt{3t - 4}$

4. $x = \frac{1}{2}t + 4$
 $y = t^3$

5. $x = 3 \cos t$
 $y = 3 \sin t$

6. $x = 4 \sin (2t)$
 $y = 2 \cos (2t)$

7. $x = \cos t$
 $y = 2 \sin^2 t$

8. $x = 4 \sec t$
 $y = 3 \tan t$

9. $x = 4 + 2 \cos t$
 $y = -1 + 4 \sin t$

10. $x = -4 + 3 \tan t$
 $y = 7 - 2 \sec t$

For the next two questions: Write two new sets of parametric equations for the following rectangular equations.

11. $y = (x + 2)^3 - 4$

12. $x = \sqrt{y^2 - 3}$

Answers:

$$2. \quad t = \frac{y-5}{4}$$

$$t = \frac{1}{\frac{y-5}{4} - 2} = \frac{1}{\frac{y-5-8}{4}} = \frac{4}{y-13}$$

$$\frac{1}{x} = y - 13 \Rightarrow y = \frac{4}{x} + 13 \Rightarrow y = \frac{4 + 13x}{x}$$

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

$$t = \frac{y^2 + 4}{3}$$

$$x = 6 - \frac{y^2 + 4}{3} \Rightarrow -x + 6 = \frac{y^2 + 4}{3} \Rightarrow -3x + 18 = y^2 + 4$$

$$-3x + 14 = y^2$$

$$y = \pm \sqrt{14 - 3x}$$

But ... y can only be positive so the Cartesian equation can only be the positive.

4.

$$t = y^{\frac{1}{3}}$$

$$x = \frac{y^{\frac{1}{3}}}{2} + 4$$

$$2(x-4) = y^{\frac{1}{3}} \Rightarrow y = 8(x-4)^3$$

5.

$$\left(\frac{x}{3}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$$

$$x^2 + y^2 = 9$$

6.

$$\frac{x}{4} = \sin(2t)$$

$$\frac{y}{2} = \cos(2t)$$

$$\sin^2(2t) + \cos^2(2t) = 1$$

$$\left(\frac{x}{4}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$$

$$\frac{x^2}{16} + \frac{y^2}{4} = 1$$

7.

$$y = 2\sin^2 t = 2(1 - \cos^2 t)$$

$$y = 2(1 - x^2) = 2(1-x)(1+x)$$

8.

$$\tan^2 t + 1 = \sec^2 t$$

$$\left(\frac{y}{3}\right)^2 + 1 = \left(\frac{x}{4}\right)^2$$

$$\frac{y^2}{9} - \frac{x^2}{16} = -1$$

$$\frac{x^2}{16} - \frac{y^2}{9} = 1$$

9.

$$\frac{x-4}{2} = \cos t$$

$$\frac{y+1}{4} = \sin t$$

$$\left(\frac{x-4}{2}\right)^2 + \left(\frac{y+1}{4}\right)^2 = 1$$

$$\frac{(x-4)^2}{4} + \frac{(y+1)^2}{16} = 1$$

10

$$\frac{x+4}{3} = \tan t$$

$$\frac{y-7}{-2} = \sec t$$

$$\tan^2 t + 1 = \sec^2 t$$

$$\left(\frac{x+4}{3}\right)^2 - \left(\frac{y-7}{-2}\right)^2 = -1$$

$$\left(\frac{y-7}{2}\right)^2 - \left(\frac{x+4}{3}\right)^2 = 1$$

$$-\frac{(x+4)^2}{9} + \frac{(y-7)^2}{4} = 1$$

11 Samples

$$x = t$$

$$y = (t+2)^3 - 4$$

or

$$x = t - 2$$

$$y = t^3 - 4$$

12 Samples

$$x = (t^2 - 3)^{\frac{1}{2}}$$

$$y = t$$

or

$$x = (t^6 - 3)^{\frac{1}{2}}$$

$$y = t^3$$