

Name Key

### Parametric Equations Homework

Find each point based on the parametric equations:

1)  $x = 4 - 3t$  and  $y = 2t + 5$   
 a)  $t = 3$       b)  $t = -2$

$(-5, 11)$        $(10, 1)$

2)  $x = t^3 - 4t$  and  $y = \sqrt{t+1}$   
 a)  $t = 3$       b)  $t = 15$

$(15, 2)$        $(3315, 4)$

3)  $x = t^2 + 5t$  and  $y = 3 - t^2$   
 a)  $t = -1$       b)  $t = 0$

$(-4, 2)$        $(0, 3)$

4)  $x = |t - 3|$  and  $y = \frac{1}{2t}$   
 a)  $t = -8$       b)  $t = \frac{1}{2}$

~~$(5, -1/8)$~~        ~~$(17/2, 2)$~~   
 $(11, -1/16)$        $(-5/2, 1)$

Convert the following parametric equations into rectangular form.

5)  $x(t) = 5 + t$   
 $y(t) = 3t + 1$

$y = 3x - 14$

6)  $x(t) = 6t - 1$   
 $y(t) = 2t + 11$

$y = \frac{1}{3}x + 34\frac{1}{3}$

7)  $x(t) = \frac{3}{t}$   
 $y(t) = 6t + 1$

$y = \frac{18}{x} + 1$

8)  $x(t) = \sqrt{t-7}$   
 $y(t) = t^2 + 9$

$y = (x^2 + 7)^2 + 9$   
 $y = x^4 + 14x^2 + 58$

9)  $x(t) = \sqrt{t}$        $x^2 = t$   
 $y(t) = \sqrt{4-t}$

$y = \sqrt{4-x^2}$

10)  $x(t) = 3 \cos(t)$   
 $y(t) = 4 \sin(t)$

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

$$11) x(t) = 8 - t$$

$$y(t) = t^2 + 10t - 100$$

$$t = -x + 8$$

$$y(t) = (-x + 8)^2 + 10(-x + 8) - 100$$

$$= x^2 - 16x + 64 - 10x + 80 - 100$$

$$y = x^2 - 26x + 44 = x^2 - 26x + 44$$

$$13) x(t) = \frac{1}{t} \quad t = \frac{1}{x}$$

$$y(t) = \frac{4}{t}$$

$$y = \frac{4}{1/x} = 4x$$

$$y = 4x$$

$$15) x(t) = -2t$$

$$y(t) = 2t^2 + 2t - 5/2$$

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

$$y = 2\left(-\frac{x}{2}\right)^2 + 2\left(-\frac{x}{2}\right) - \frac{5}{2}$$

$$y = \frac{x^2}{2} - x - \frac{5}{2}$$

Write two new sets of parametric equations for the following rectangular equations.

$$17) y = (x + 2)^3 - 4$$

$$x(t) = t - 2 \quad y(x) = t^3 - 4$$

$$t = x + 2$$

$$12) x(t) = 2 + 5\sec(t) \quad \frac{x-2}{5} = \sec t$$

$$y(t) = 1 + 3\tan(t)$$

$$\frac{y-1}{3} = \tan t$$

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

$$14) x(t) = 4\cos(t) - 1$$

$$y(t) = 3\sin(t) + 1$$

$$\frac{x+1}{4} = \cos t$$

$$\frac{y-1}{3} = \sin t$$

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

$$16) x(t) = 6 - t \quad -x + 6 = t$$

$$y(t) = \sqrt{3t - 4}$$

$$y = \sqrt{3(-x + 6) - 4}$$

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

$$18) y = \sqrt{x^2 - 3}$$

$$x(t) = \sqrt{t+3} \quad y(t) = \sqrt{t}$$

or  
~~x(t) =~~  
 $x = t$

$$y = \sqrt{t^2 - 3}$$