

Graphing Parametric and Converting Parametric to Rectangular

1-2: 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.

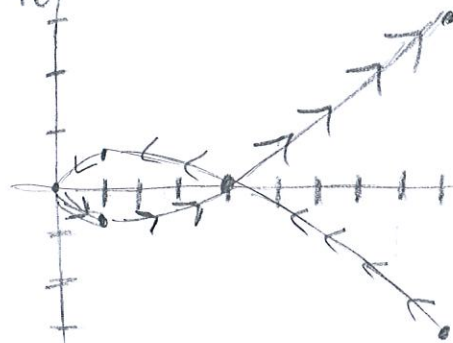
1.  $x=t^2+t, y=t^2-t, -2 \leq t \leq 2$

$t$	$x=t^2+t$	$y=t^2-t$
-2	2	6
-1	0	2
0	0	0
1	2	0
2	6	2



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

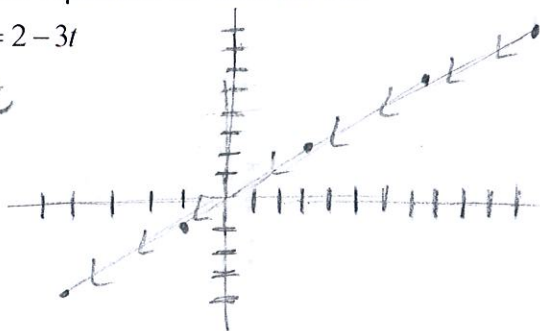
$t$	$x=t^2$	$y=t^3-4t$
-3	9	-15
-2	4	0
-1	1	3
0	0	0
1	1	-3
2	4	0
3	9	15



3-6: 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 the Cartesian equation of the curve.

3.  $x=3-4t, y=2-3t$

$t$	$x=3-4t$	$y=2-3t$
-2	11	8
-1	7	5
0	3	2
1	-1	-1
2	-5	-4



$$x = 3 - 4t$$

$$4t = 3 - x$$

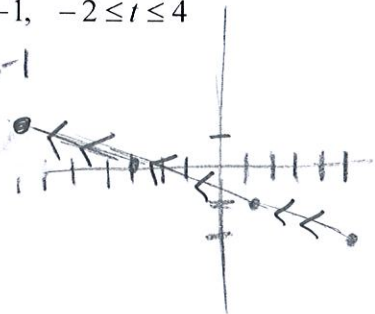
$$t = \frac{3 - x}{4}$$

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

$$y = \frac{8}{4} - \frac{9}{4} + \frac{3}{4}x \quad \boxed{y = \frac{3}{4}x - \frac{1}{4}}$$

4.  $x=1-2t, y=\frac{1}{2}t-1, -2 \leq t \leq 4$

$t$	$x=1-2t$	$y=\frac{1}{2}t-1$
-2	5	-2
0	1	-1
2	-3	0
4	-7	1



$$x = 1 - 2t \quad y = \frac{1}{2}t - 1$$

$$2t = 1 - x$$

$$t = \frac{1 - x}{2}$$

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

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

$$\boxed{y = -\frac{1}{4}x - \frac{3}{4}}$$

5.  $x=1-t^2, y=t-2, -2 \leq t \leq 2$

$t$	$x=1-t^2$	$y=t-2$
-2	-3	-4
-1	0	-3
0	1	-2
1	0	-1
2	-3	0



$$y = t - 2$$

$$t = y + 2$$

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

$$x = 1 - (y^2 + 4y + 4)$$

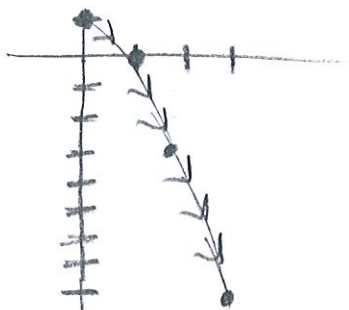
$$x = 1 - y^2 - 4y - 4$$

$$\boxed{x = -y^2 - 4y - 3}$$

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6.  $x = \sqrt{t}, y = 1 - t$

t	$x = \sqrt{t}$	$y = 1 - t$
0	0	1
1	1	0
4	2	-3
9	3	-8



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

$y = 1 - t$   
 $y = 1 - x^2$

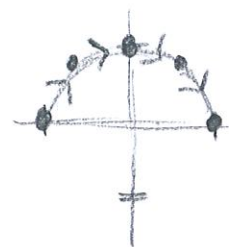
7-10: A.) Eliminate the parameter to find the Cartesian equation of the curve. B.) Sketch the curve by using the parametric equations to plot points. Indicate with an arrow the direction in which the curve is traced as t increases.

7.  $x = \sin(\frac{1}{2}\theta), y = \cos(\frac{1}{2}\theta), -\pi \leq \theta \leq \pi$

$x^2 + y^2 = 1$

from graph ☺

t	$x = \sin(\frac{1}{2}\theta)$	$y = \cos(\frac{1}{2}\theta)$
$-\pi$	$\sin(-\frac{\pi}{2}) = -1$	0
$-\frac{\pi}{2}$	-0.7	.7
0	0	1
$\frac{\pi}{2}$	.7	.7
$\pi$	1	0



8.  $x = \sin(t), y = \csc(t), 0 < t \leq \frac{\pi}{2}$

look like

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

t	$x = \sin(t)$	$y = \csc t$
0	0	ud
$\pi/6$	.5	2
$\pi/4$	.7	1.4
$\pi/3$	.9	1.15
$\pi/2$	1	1



Make sure you can graph

9.  $x = e^{2t}, y = t + 1$

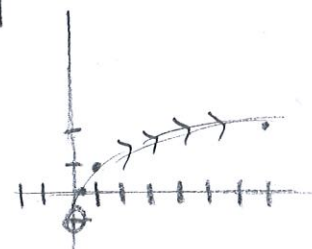
$\ln x = \ln e^{2t}$

$\ln(x) = 2t$

$t = \frac{1}{2} \ln(x)$

$y = t + 1$   
 $y = \frac{1}{2} \ln(x) + 1$

t	$x = e^{2t}$	$y = t + 1$
-2	.01	-1
-1	.1	0
0	1	1
1	7	2
2	54	3
3	403	4



10.  $x = \tan^2 \theta, y = \sec \theta, -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$

$\theta$	$\tan^2 \theta$	$\sec \theta$
$-\pi/2$	$\infty$	ud
$-\pi/4$	1	1.4
0	0	1
$\pi/4$	1	1.4
$\pi/2$	$\infty$	ud

