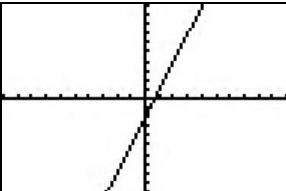
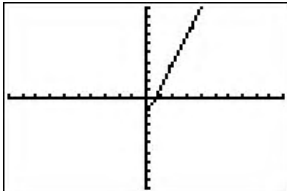


## PreCalculus Class Notes VP4 Graphing Parametric Curves

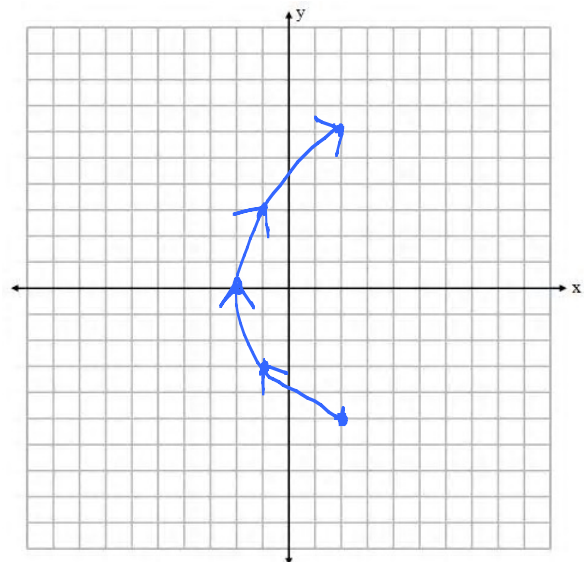
Rectangular equation	Parametric equation																																			
$y = 3x - 2$	$x(t) = t$ $y(t) = 3t - 2$																																			
<div style="display: flex; justify-content: space-between;"> <pre style="font-family: monospace; font-size: 0.8em;"> NORMAL SCI ENG FLOAT 0 1 2 3 4 5 6 7 8 9 RADIAN DEGREE FUNC PAR POL SEQ CONNECTED DOT SEQUENTIAL SIMUL REAL a+bi re^θi FULL HORIZ G-T ↓NEXT↓                     </pre> <pre style="font-family: monospace; font-size: 0.8em;"> Plot1 Plot2 Plot3 Y1=3X-2 Y2= Y3= Y4= Y5= Y6= Y7=                     </pre> </div>	<div style="display: flex; justify-content: space-between;"> <pre style="font-family: monospace; font-size: 0.8em;"> NORMAL SCI ENG FLOAT 0 1 2 3 4 5 6 7 8 9 RADIAN DEGREE FUNC PAR POL SEQ CONNECTED DOT SEQUENTIAL SIMUL REAL a+bi re^θi FULL HORIZ G-T ↓NEXT↓                     </pre> <pre style="font-family: monospace; font-size: 0.8em;"> Plot1 Plot2 Plot3 X1T=T Y1T=3T-2 X2T= Y2T= X3T= Y3T= X4T=                     </pre> </div>																																			
<pre style="font-family: monospace; font-size: 0.8em;"> WINDOW Xmin=-10 Xmax=10 Xscl=1 Ymin=-10 Ymax=10 Yscl=1 ↓Xres=1                     </pre>	<div style="display: flex; justify-content: space-between;"> <pre style="font-family: monospace; font-size: 0.8em;"> WINDOW Tmin=0 Tmax=6.2831853... Tstep=.1308996... Xmin=-10 Xmax=10 Xscl=1 ↓Ymin=-10                     </pre> <pre style="font-family: monospace; font-size: 0.8em;"> WINDOW Tmin=0 Tmax=6 Tstep=.1 Xmin=-10 Xmax=10 Xscl=1 ↓Ymin=-10                     </pre> </div>																																			
<div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 10px; border-collapse: collapse; font-size: 0.8em;"> <thead> <tr> <th>X</th> <th>Y1</th> </tr> </thead> <tbody> <tr><td>0</td><td>-2</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>7</td></tr> <tr><td>4</td><td>10</td></tr> <tr><td>5</td><td>13</td></tr> </tbody> </table> </div> <p style="text-align: center; font-size: 0.8em;">Press + for Δ T </p>	X	Y1	0	-2	1	1	2	4	3	7	4	10	5	13	<div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 10px; border-collapse: collapse; font-size: 0.8em;"> <thead> <tr> <th>T</th> <th>X1T</th> <th>Y1T</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>-2</td></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td><td>4</td></tr> <tr><td>3</td><td>3</td><td>7</td></tr> <tr><td>4</td><td>4</td><td>10</td></tr> <tr><td>5</td><td>5</td><td>13</td></tr> </tbody> </table> </div> <p style="text-align: center; font-size: 0.8em;">Press + for Δ t </p>	T	X1T	Y1T	0	0	-2	1	1	1	2	2	4	3	3	7	4	4	10	5	5	13
X	Y1																																			
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Graph by hand

$x = t^2 - 2$

$y = 3t$

$t$	$x$	$y$
-2	2	-6
-1	-1	-3
0	-2	0
1	-1	3
2	2	6

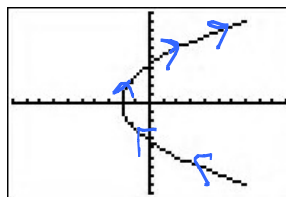
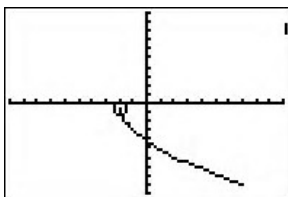


0

Then on calculator

Plot1	Plot2	Plot3
X1T	T <sup>2</sup> -2	
Y1T	3T	
X2T	=	
Y2T	=	
X3T	=	
Y3T	=	

T	X1T	Y1T
T=-3		



Window  $t_{min}$   $t_{max}$

### Converting Equations

From rectangular to parametric—easy!

$y = 3x^2 + \sqrt{x}$	$x = y^3 \rightarrow y = \sqrt[3]{x}$
$x = t$	$x = t^3$
$y = 3t^2 + \sqrt{t}$	$y = t$
	$x = t$
	$y = \sqrt[3]{t}$

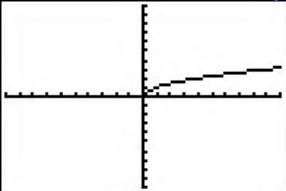
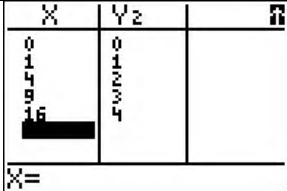
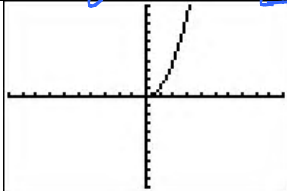
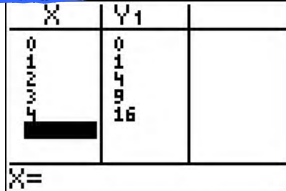
From parametric to rectangular—solve  $x$  equation for  $t$ , then substitute into  $y$  equation

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

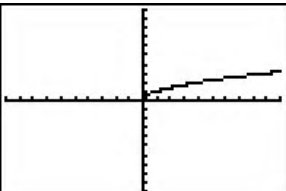
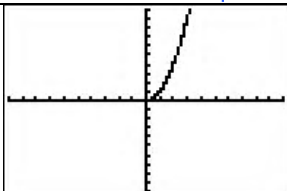
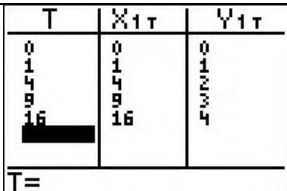
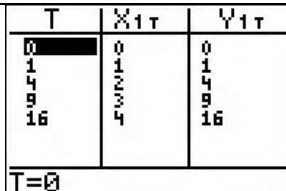
equivalent

### Graphing Inverses

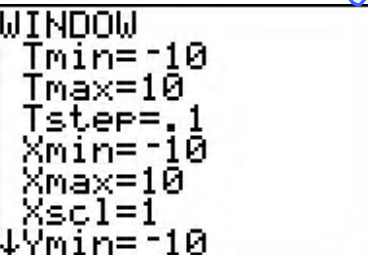

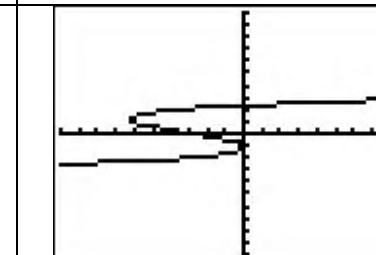
In rectangular form, switch  $x$  and  $y$ , solve for  $y$ . Convert domain restrictions to range and then to domain of the inverse.

$y = \sqrt{x}, x \geq 0, y \geq 0$	$x = \sqrt{y} \rightarrow x^2 = y$	Find its inverse $y = x^2, y \geq 0, x \geq 0$	QI only ✓
			

In parametric mode, just swap the two equations

$x = t$	$x = \sqrt{t}$
$y = \sqrt{t}$	$y = t$
	
	

Graph the inverse of  $y = x^3 - 4x - 3$

$x = t$	$x = t^3 - 4t - 3$	$x = t^3 - 4t - 3$	$y = t$
			

Radius mode  
before  
Zoom Standard

Zoom Square  
is best for seeing  
 $y = x$  symmetry