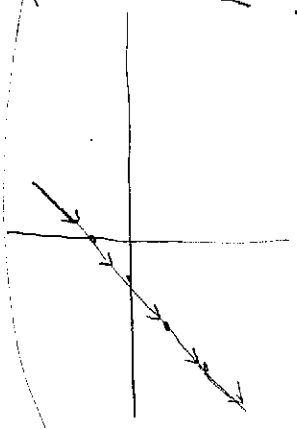


Parametric Equations Worksheet Key

1) $x = 1+t$
 $y = t \Rightarrow x = 1+y \Rightarrow y = x-1$

$P_x: (60, 20)$
 $P_y: (10, \infty)$

$D: (-20, 20)$
 $R: (-20, 20)$

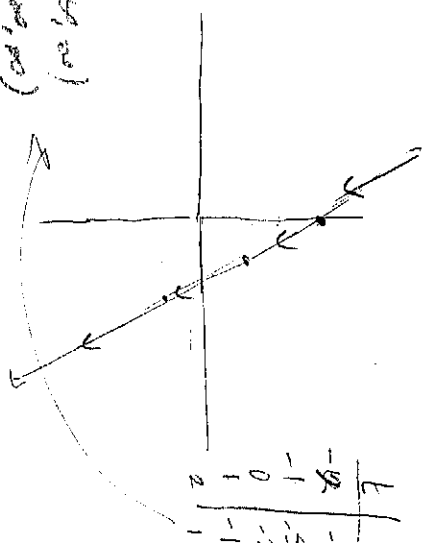


t	x	y
-2	-1	-2
-1	0	-1
0	1	0
1	2	1
2	3	2

2) $x = 2t-3 \Rightarrow \frac{x+3}{2} = t$
 $y = 9-4t$

$P_x: (-2, \infty)$
 $P_y: (10, \infty)$
 $D: (-2, \infty)$
 $R: (10, \infty)$
 $y = 9 - 4 \left(\frac{x+3}{2} \right)$
 $= -2x + 3$

$D: (-4, \infty)$
 $R: (-20, \infty)$



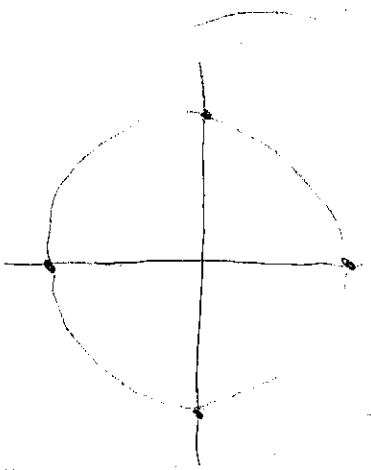
t	x	y
-2	-7	13
-1	-5	9
0	-3	3
1	-1	-1
2	1	-5

3) $x = 4\sin t$
 $y = 4\cos t$
 $x^2 = 16\sin^2 t$
 $y^2 = 16\cos^2 t$

$16\sin^2 t + 16\cos^2 t = 16$
 $x^2 + y^2 = 16$

Circle $C(0,0)$ $r=4$

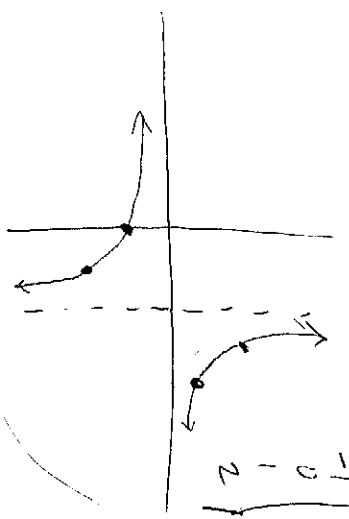
$D: [-4, 4]$
 $R: [-4, 4]$



t	x	y
$-\frac{\pi}{2}$	-4	0
0	0	4
$\frac{\pi}{2}$	4	0
π	0	-4

4) $x = t+2$
 $x-2 = t$
 $y = \frac{2}{x-2}$

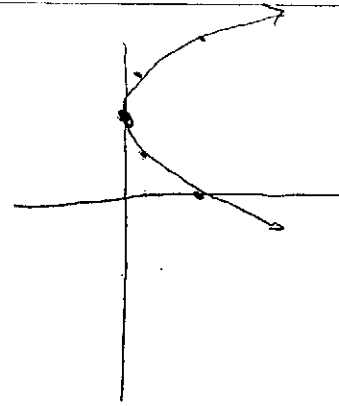
$D: (-\infty, 2)$
 $P_x: (0, \infty)$
 $P_y: (0, \infty)$
 $HA: 2$
 $VA: x=2$
 $(0, \infty)$ $y \rightarrow -1$



t	x	y
-2	0	-1
-1	1	-2
0	2	3
1	3	1
2	4	0.5

$D: (-\infty, 2)$
 $P: (0, \infty)$

5) $x = 4t - 2 \quad y = 8t^2$
 $\frac{x+2}{4} = t \Rightarrow y = 8 \left(\frac{x+2}{4} \right)^2$
 $= 8 \frac{(x+2)^2}{16}$
 $= \frac{1}{2} (x+2)^2$



D: $(-\infty, \infty)$
R: $[0, \infty)$

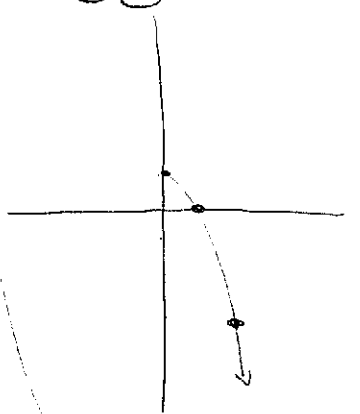
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$
Ry: $(-\infty, \infty)$
Rx: $(-\infty, \infty)$
Ry: $[0, \infty)$

t	x	y
-2	-10	8
-1	-4	2
0	-2	0
1	2	8
2	6	32

6) $x = t - 3 \quad y = \sqrt{t - 2}$
 $x + 3 = t \quad y = \sqrt{x + 1}$

Dx: $(-\infty, \infty)$ / $[3, \infty)$ Rx: $(-1, \infty)$
 Dy: $(-\infty, \infty)$ / $[0, \infty)$ Ry: $[0, \infty)$

D: $\{(-1, \infty)\}$
R: $[0, \infty)$



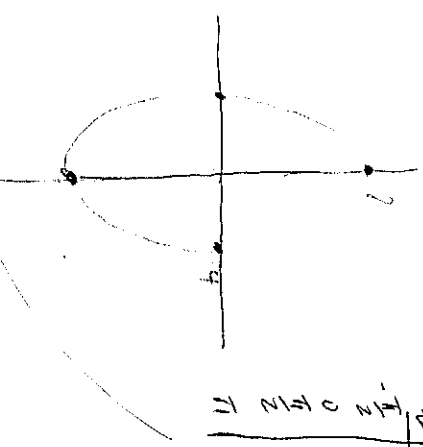
t	x	y
2	-1	0
3	0	1
4	1	2

7) $x = 4 \cos t \quad y = 8 \sin t$

$x^2 = 16 \cos^2 t \quad y^2 = 64 \sin^2 t$
 $\frac{x^2}{16} = \cos^2 t \quad \frac{y^2}{64} = \sin^2 t$

Ellipse
a = 8
b = 4
vertical

D: $[-4, 4]$
R: $[-8, 8]$



t	x	y
$-\frac{\pi}{2}$	0	-8
0	4	0
$\frac{\pi}{2}$	0	8
π	-4	0

8) $x = 5 - 3t$

$\frac{x-5}{-3} = t$

$\frac{dx}{dt} (-2t, 2t)$

$\frac{dy}{dt} (-2t, 2t)$

D: $(-2t, 2t)$
 R: $(-2t, 2t)$

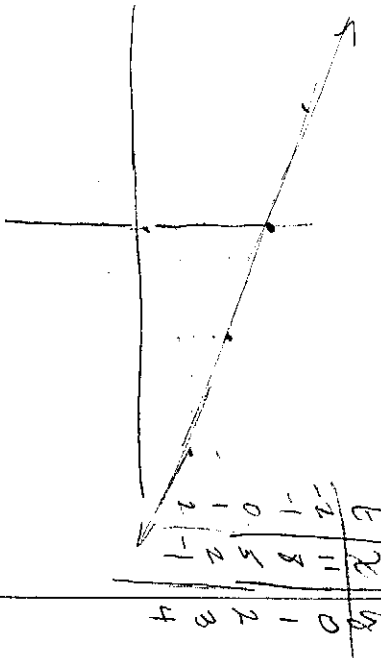
$y = 2 + t$

$= 2 + \frac{-x+5}{3}$

$= \frac{6-x+5}{3}$

$= \frac{-x+11}{3}$

$= -\frac{1}{3}x + \frac{11}{3}$



9) $x = 3t - 1$

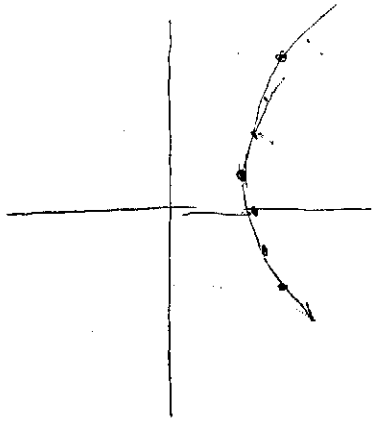
$\frac{x+1}{3} = t$

$y = t^2 + 2$

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

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

$= \sqrt{(-1, 2)}$



t	x	y
-2	-7	6
-1	-4	3
0	-1	2
1	2	3
2	5	6

D: $(-2t, 2t)$
 R: $(2, 2t)$

Dx = $(-2t, 2t)$
 Dy = $(2, 2t)$

10) $x = |t|$

$y = t$

$x = |y|$

$x = \pm t$

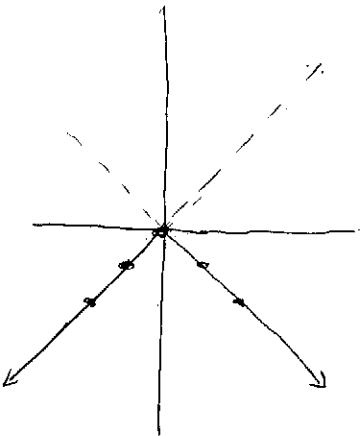
$y = \pm x$

D: $(-1, \infty)$
R: $(0, \infty)$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

L: $(-1, \infty)$

L	R	y
0	2	-2
-1	1	-1
0	0	0
1	-1	1
2	2	2



D: $(0, \infty)$
R: $(-\infty, \infty)$

11) $x = \sqrt{t}$

$y = \sqrt{t}$

$x^2 = t$

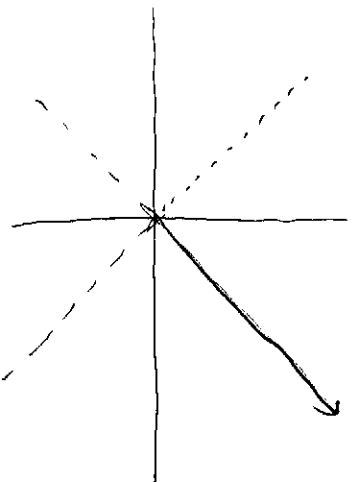
D: $(0, \infty)$
R: $(0, \infty)$

D: $(0, \infty)$
R: $(0, \infty)$

L: $(0, \infty)$

$y = \sqrt{x^2}$
 $y = \pm x$

L	R	y
0	0	0
1	1	1
4	2	2
9	3	3



D: $(0, \infty)$
R: $(0, \infty)$

12) $x = \sqrt{t}$

$y = 1-t$

$x^2 = t$

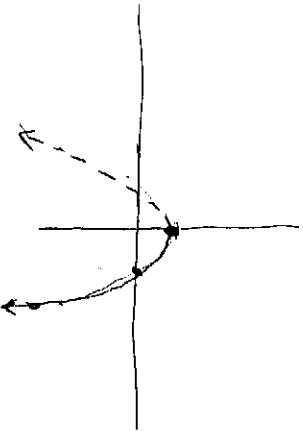
D: $(0, \infty)$
R: $(0, \infty)$

D: $(-\infty, 1)$
R: $(-1, 1)$

L: $(0, \infty)$

$y = 1 - x^2$

L	R	y
0	0	1
1	1	0
4	2	-3
9	3	-8



D: $(0, \infty)$
R: $(-\infty, 1)$

13) $x = 3\sqrt{t}$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

$y = 1-t$

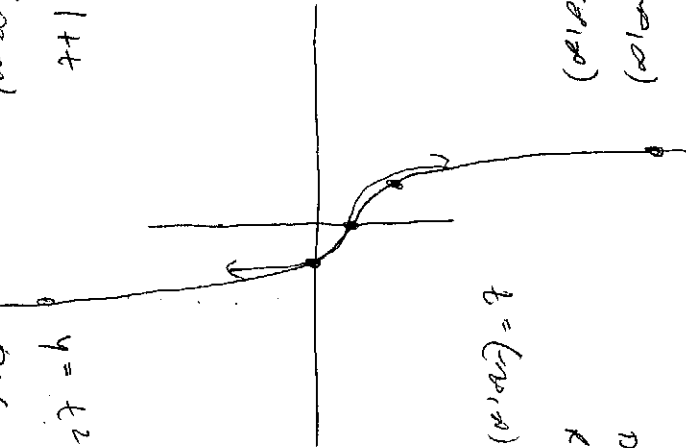
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

$t = (-\infty, \infty)$

$x^3 = t$

$y = 1 - x^3$
 $y = -x^3 + 1$

t	x	y
-8	-2	9
-1	-1	2
0	0	1
1	1	0
8	2	-7



14) $x = 1+t$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

$y = t^2$

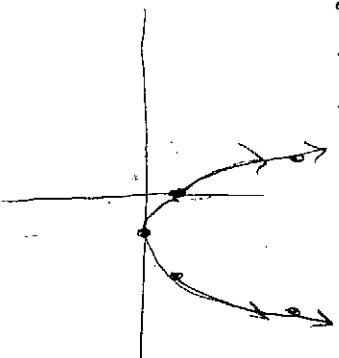
D: $(-\infty, \infty)$
R: $[0, \infty)$

$t = (-\infty, \infty)$

D: $(-\infty, \infty)$
R: $[0, \infty)$

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

t	x	y
-2	-1	9
-1	0	4
0	1	1
1	2	0
2	3	1
3	4	4



15) $x = t+1$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

$y = t^3$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

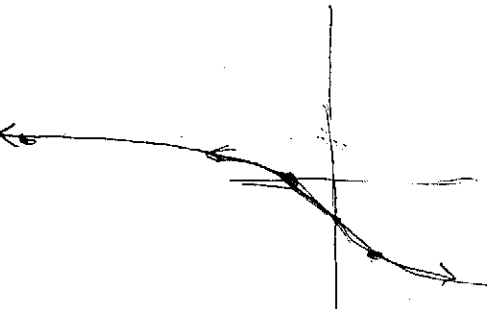
$t = (-\infty, \infty)$

$x+1 = t$

$y = (x-1)^3$

D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

t	x	y
-2	-1	-8
-1	0	-1
0	1	0
1	2	1
2	3	8





16)

$x = \sqrt{1-t}$

$1-t = 2t$

$y = \sqrt{t}$

$x^2 = (1-t)$

$y = t^2$

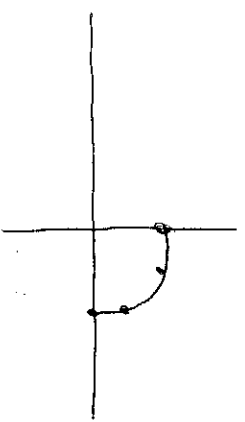
D: $(-8, 1)$
 R: $(0, 1)$

D: $(0, \infty)$
 R: $(0, 1]$

D: $(0, 1]$

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

t	x	y
0	1	0
1/4	3/2	1/2
1	0	1
3/4	1/2	3/2



D: $(0, 1]$
 R: $(0, 1]$

17)

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

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

$y = t$

$x^2 = 1-t^2$

$y^2 = t^2$

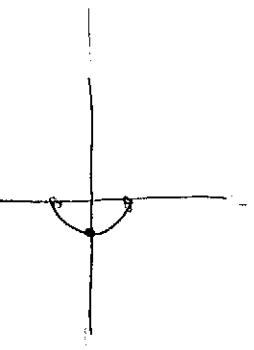
D: $(-1, 1]$
 R: $(0, 1]$

D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$

$b: [-1, 1]$

$x^2 + y^2 = 1$

t	x	y
-1	0	1
0	1	0
1	0	1



D: $(0, 1]$
 R: $(-1, 1]$

18)

$x = \cos t$

$y = 35 \sin t$

D: $(-\pi, \pi)$
 R: $(-1, 1]$

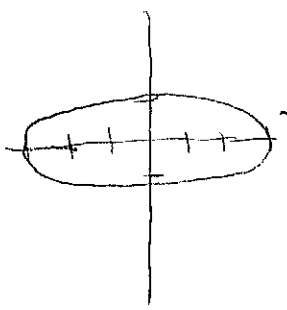
D: $(-\infty, \infty)$
 R: $(-3, 3]$

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

$x^2 = \cos^2 t$

$\frac{y^2}{9} = 35^2 \sin^2 t$

D: $(-1, 1]$
 R: $(-3, 3]$



t	x	y
0	1	0
pi/2	0	3
pi	-1	0
3pi/2	0	-3

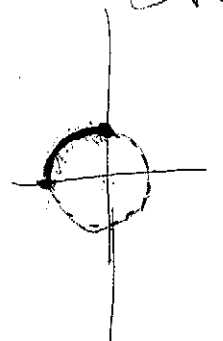
19) $x = -\sqrt{1-t}$
 $= -\sqrt{-(t+1)}$
 D: $(-\infty, 1]$
 R: $[-1, 0]$

$y = -\sqrt{t}$
 D: $(0, \infty)$ $\Rightarrow [0, 1]$
 R: $[-1, 0]$

t	x	y
0	-1	0
1/4	-1/2	1/2
3/4	-1/2	1/2
1	0	-1

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

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



D: $[-1, 0]$
 R: $[-1, 0]$

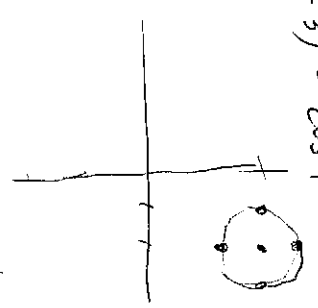
20) $x = 2 + \sin 4t$
 D: $(-\infty, \infty)$
 R: $[1, 3]$

$y = 3 + \cos 4t$
 D: $(-\infty, \infty)$
 R: $[2, 4]$

$(x-2)^2 = \sin^2 4t$

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

$(x-2)^2 + (y-3)^2 = 1$



D: $[1, 3]$
 R: $[2, 4]$

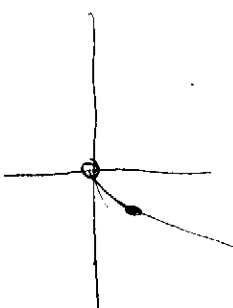
t	x	y
0	1	3
pi/2	2	4
pi	3	3
3pi/2	2	2
2pi	1	3

21) $x = e^t$
 D: $(-\infty, \infty)$
 R: $(0, \infty)$

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

$y = e^{2t}$
 D: $(-\infty, \infty)$
 R: $(0, \infty)$

$y = x^2$



D: $(0, \infty)$
 R: $(0, \infty)$

t	x	y
-2	.135	.02
-1	.368	.14
0	1	1
1	2.7	7.4
2	7.4	54.6