8.4 Parametric Equations

31) a- Graph curve
b- write rectangular EQ
32) Line Segment

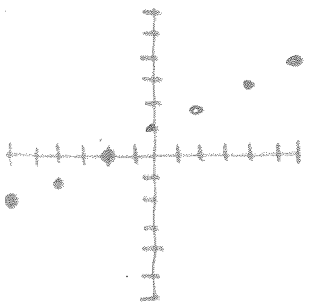
- Graphs that can't be modelled by functions can be modelled by Parametric Equations

(x,y) where $x=f(t)$ $y=g(t)$ t is the parameter on the interval $a \le t \le b$

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

$-3 \le t \le 3$

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



Converting Equations to Rectangular

1) solve $x(t)$ for t
2) substitute t into $y(t)$

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

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

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

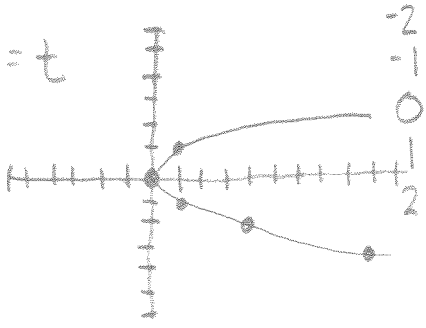
$x = t^2 - 2t + 1 \quad y = t - 1$

$x = (t-1)^2 \quad y = (\sqrt{x}+1) - 1$

$\sqrt{x} = t - 1 \quad y = \sqrt{x}$

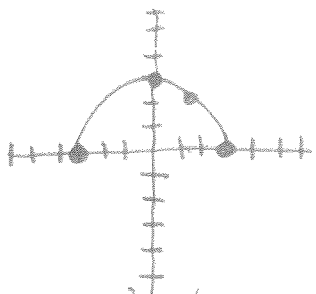
$\sqrt{x} + 1 = t$

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



$x = 3\cos 2t \quad y = 3\sin 2t \quad \text{for } 0 \le t \le \pi$

t	x	y
0	3	0
$\pi/6$	$3/2$	$\frac{3\sqrt{3}}{2}$
$\pi/2$	-3	0
π	0	3



$x^2 + y^2 = (3\cos\theta)^2 + (3\sin\theta)^2$
$= 9\cos^2\theta + 9\sin^2\theta$
$= 9(\sin^2\theta + \cos^2\theta) = 9$

Converting to Parametric Equations

$y = 2x - 3$ from $(-1,-5)$ to $(3,3)$ $m = 2$

$x(t) = -1 - 2t$ $\quad 0 \le t \le -2$ or $-2 \le t \le 0$

$y(t) = -5 - 4t$

or $x(t) = -1 + 2t$ $\quad 0 \le t \le 2$

$y(t) = -5 + 4t)$

$y = -3x$ from $(-2,6)$ to $(3,-9)$ $m = -3$

$x(t) = -2 + t$ $\quad y(t) = 6 - 3t$ $\quad 0 \le t \le 5$

$x(t) = -2 + 5t$ $\quad y(t) = 6 - 15t$ $\quad 0 \le t \le 1$

$y = 3x - 2$ from $(-3,-11)$ to $(5,13)$ $m = 3$

$x(t) = -3 + t$ $\quad y(t) = -11 + 3t$ $\quad 0 \le t \le 8$

$x(t) = -3 + 2t$ $\quad y(t) = -11 + 6t$ $\quad 0 \le t \le 4$

HW: p. 667; 1, 3, 5, 9, 11, 19, 21, 23, ~~47~~, 43 from $(-1,6)$ to $(3,-2)$, and 44 from $(0,4)$ to $(-5,0)$