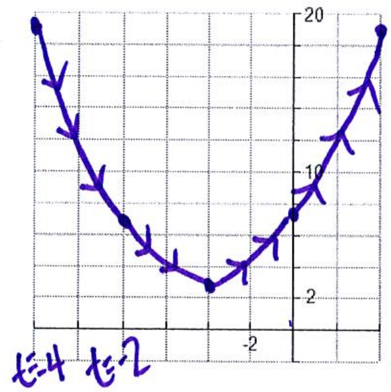
Parametric Equations: $C(t) = (f(t), g(t))$ C is referred to as a parameterized or parametric curve.

$$x = f(t) \quad and \quad y = g(t)$$

Example One: Graph the parametric curve. Then rewrite the parametric in rectangular form.

$C(t) = (2t - 4, 3 + t^2)$

t	$x = 2t - 4$	$y = 3 + t^2$
-4	-12	19
-2	-8	7
0	-4	3
2	0	7
4	4	19



$\boxed{1.}$ Solve for the easier t:

$C(t) = (2t-4, 3+t^2)$

$x = 2t - 4$

$+4 \quad +4$

$\frac{2t}{2} = \frac{x+4}{2}$ $t = \frac{1}{2}x + 2$

$\boxed{2}$ Sub into other piece

$y = 3 + t^2$

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

$y = 3 + \frac{1}{4}x^2 + 2x + 4$

$\boxed{y = \frac{1}{4}x^2 + 2x + 7}$

Rewriting Equations from rectangular →parametric:

Rectangular: Line through a point (a, b) with a slope$= m$

Parametric: $C(t) = (a + t, b + mt)$

Rectangular: Circle of radius$= r$ centered at the origin

Parametric: $C(\theta) = (r\cos\theta, r\sin\theta)$

Rectangular: Circle of radius$= r$ centered at (a, b)

Parametric: $C(\theta) = (a + r\cos\theta, b + r\sin\theta)$

Rectangular: An ellipse $\left(\frac{x}{a}\right)^2 + \left(\frac{y}{b}\right)^2 = 1$

Parametric: $C(\theta) = (a\cos\theta, b\sin\theta)$

Rectangular: Any other non-special

Parametric: You solve for x Then $(x = \quad , t)$ OR You solve for $y =$ Then $(t, y = \quad)$

Example Two: Rewrite in parametric

A. $y = \boxed{8x^2 - 3x}$

$c(t) = (t, 8t^2 - 3t)$

B. $3x + 2y^2 = 5$

Solve for x

$3x + \cancel{2y^2} = 5 - 2y^2$

$\frac{3x}{3} = \frac{5 - 2y^2}{3}$

$x = \frac{5}{3} - \frac{2}{3}y^2$

$c(t) = \left(\frac{5}{3} - \frac{2}{3}t^2, t\right)$

C. Line of slope of $m = 4$ through the point $(2,5)$

$\boxed{1.}$ $c(t) = (2 + t, 5 + 4t)$

t	$x = 2+t$	$y = 5+4t$
-1	1	1
0	2	5
1	3	9
2	4	13

$\boxed{2.}$ $y = mx + b$

$5 = 4(2) + b$

$b = -3$

$y = 4x - 3$

$c(t) = (t, 4t - 3)$

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

D. Circle of radius $r = 2$ with center $(-2,3)$

$c(t) = (-2 + 2\cos t, 3 + 2\sin t)$