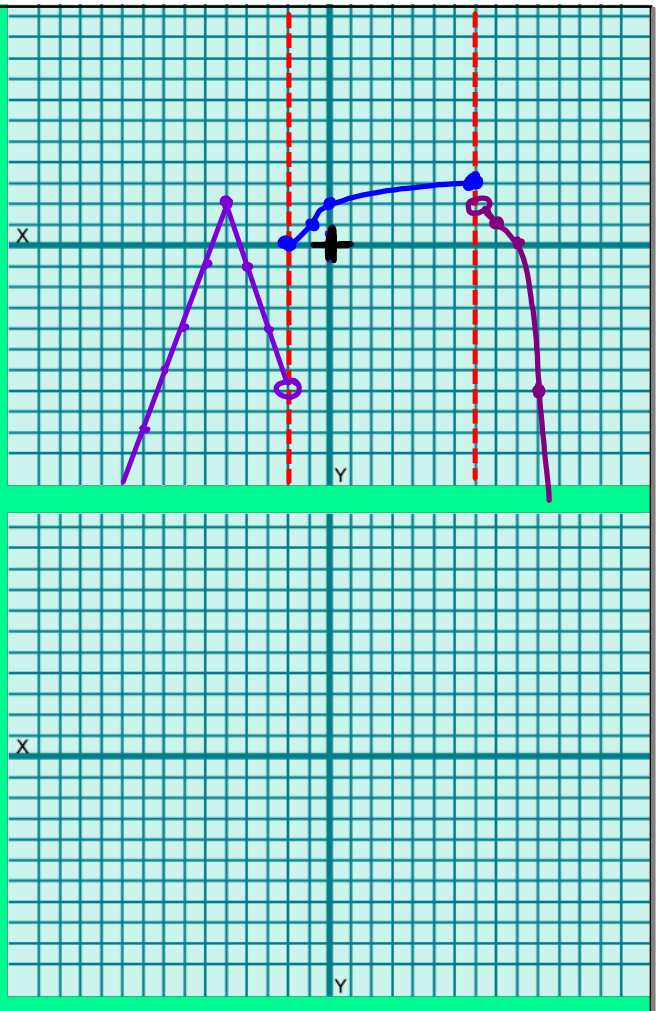
Piecewise Functions

$$f(x)=\begin{cases} -3|x-5|+2 & x<-2 \\ \sqrt[3]{x+1}+1 & -2\le x\le 7 \\ -(x-8)^3+1 & x>7 \end{cases}$$

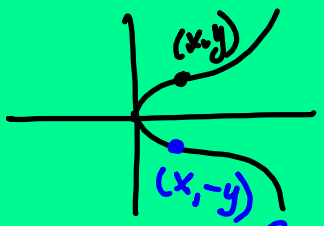
0	0
1	1
8	2

0	0
1	−1
2	−8



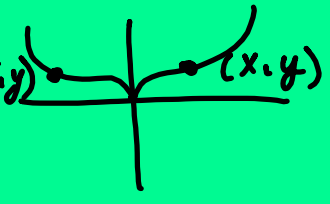
Symmetry of Graphs

x-axis
sub in $-y$

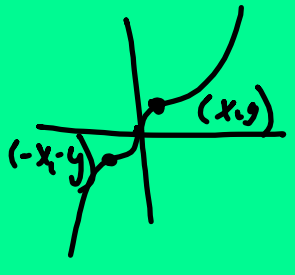


not a func.

y-axis
sub in $-x$



Origin
sub in $-x$ and $-y$.



Must get original back eg.

$y = 2x^2 + 1$

x-axis $-y = 2x^2 + 1$ No

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

Origin
$-y = 2(-x)^2 + 1$
$-y = 2x^2 + 1$
No

Has y-axis Symmetry

$4xy + 2x^2 = 7$

x-axis
sub in $-y$
$4x(-y) + 2x^2 = 7$
$-4xy + 2x^2 = 7$ No

y-axis
sub in $-x$
$4(-x)y + 2(-x)^2 = 7$
$-4xy + 2x^2 = 7$ No

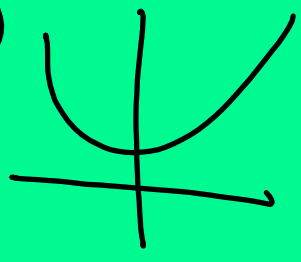
Origin
sub in $-x$ & $-y$
$4(-x)(-y) + 2(-x)^2 = 7$
$4xy + 2x^2 = 7$ yes

EVEN/ODD FUNCTIONS

← must pass vertical line test

EVEN $f(-x) = f(x)$ (same as y-axis symm.)

ODD $f(-x) = -f(x)$ (same as origin symm.)
$-y$



Even, Odd, Neither?

$f(x) = 3x^6 - 2x^2 + 4$

$f(-x) = 3(-x)^6 - 2(-x)^2 + 4$

$= 3x^6 - 2x^2 + 4$ ← same as original eq. = Even

$f(x) = x^3 - x + 1$

$f(-x) = (-x)^3 - (-x) + 1$

$= -x^3 + x + 1$ ← not original eq., not even

$= -(x^3 - x - 1)$ ← not original eq = **Neither**

$\frac{-1}{2}$ $\frac{1}{-2}$ $-\frac{1}{2}$

$f(x) = \frac{4x}{3x^2 - 5}$

$f(-x) = \frac{4(-x)}{3(-x)^2 - 5} = \frac{-4x}{3x^2 - 5}$ ← not original not even

$= -\frac{4x}{3x^2 - 5}$ **ODD**