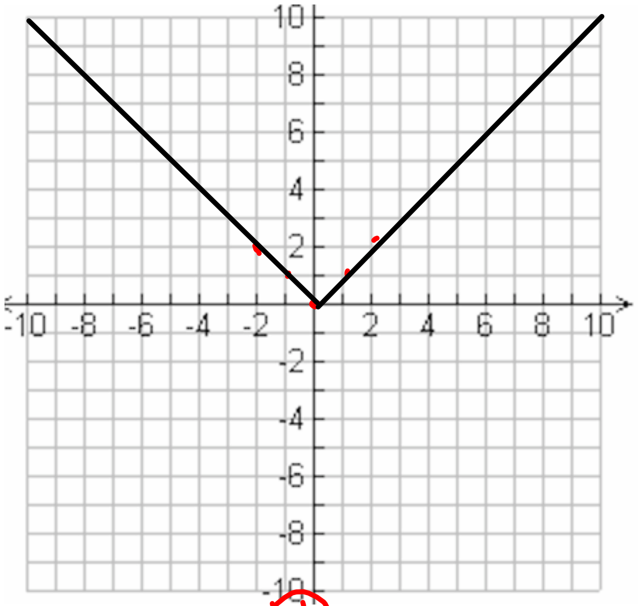
Absolute Value Function

1) Basic Absolute Value Function: $f(x) = |x|$

Graph:

x	y
-2	2
-1	1
0	0
1	1
2	2



dom f: $\mathbb{R}$

ran f: $\mathbb{R}_+$

zero: $(0,0)$

initial value: $y = 0$

sign: $f(x) \geq 0$ on $\mathbb{R}$

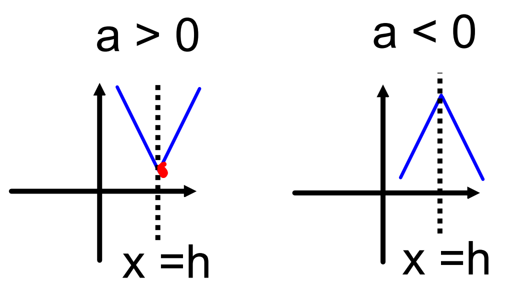
variation: dec: $]-\infty, 0]$
inc: $[0, +\infty[$

extrema:
min at $(0,0)$

2) Absolute Value function $f(x) = a|b(x-h)| + k$

Vertex: $V(h,k)$

Graph is open:
- upward if $a > 0$.
- downward if $a < 0$.



Axis of symmetry: $x = h$

Zero: exists if *k* and *a* are opposite signs or

$k = 0$.

Graph the following:

$$f(x) = -\frac{2}{3}|x-2| + 4$$

Solution:

1) Plot the vertex

2) Use the concept of slope, $\left(\frac{\Delta y}{\Delta x}\right)$, to generate the two rays.

3) Find the zeros if they exist.

Graph the following:

$f(x) = -\frac{2}{3}|x-2|+4$

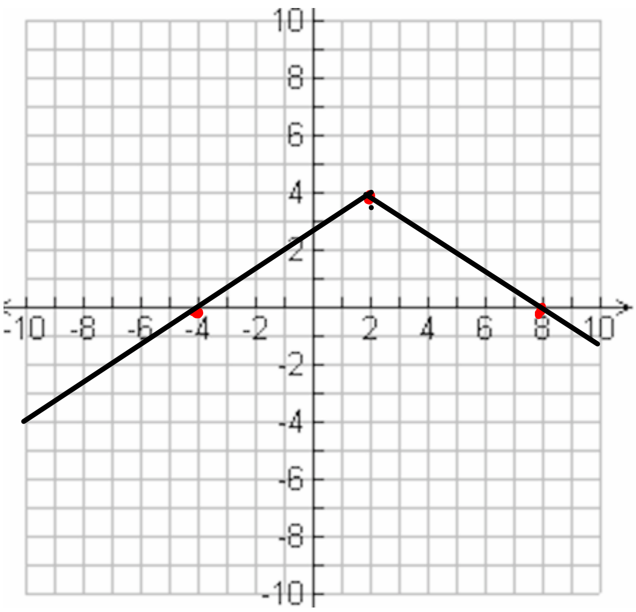
$0 = -\frac{2}{3}|x-2|+4$

$-4 = -\frac{2}{3}|x-2|$

$6 = |x-2|$

$x-2 = 6$ | $x-2 = -6$

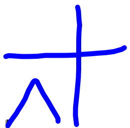
$x = 8$ | $x = -4$



Re-write each of the following in the form:

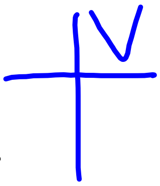
$y = a|x-h| + k$

a) $f(x) = -|4(x+2)| + 1$



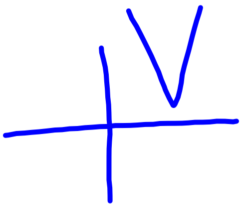
$f(x) = -4|x+2|+1$

b) $y = 2|3x-9|+4$



$f(x) = 6|x-3|+4$

c) $f(x) = 2|8-4x|+1$



$= 2|-4(x-2)|+1$

$= 2|-4||x-2|+1$

$= 2(4)|x-2|+1$

$= 8|x-2|+1$