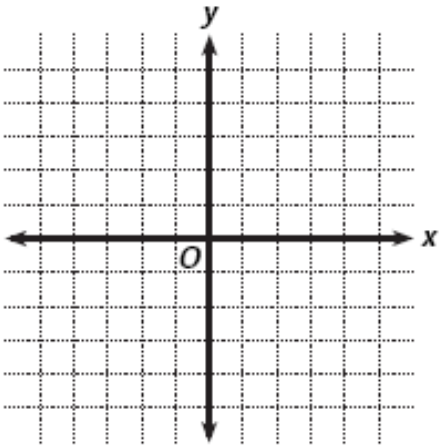
1.3 Notes: Transformations of Absolute Value Function

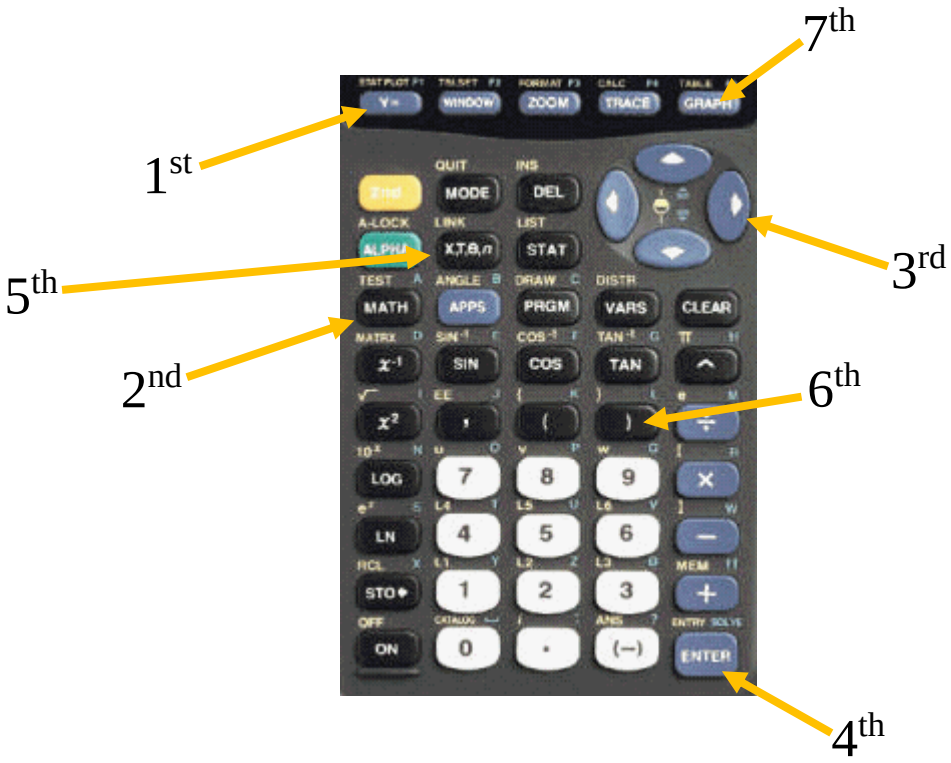
Absolute Value Function: A function that always takes the positive value of a number.

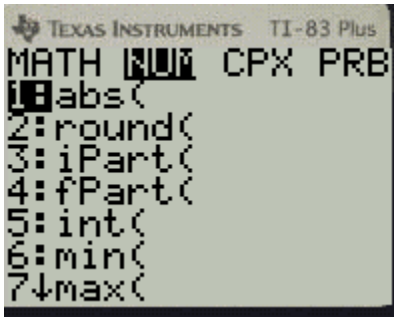
By Hand:

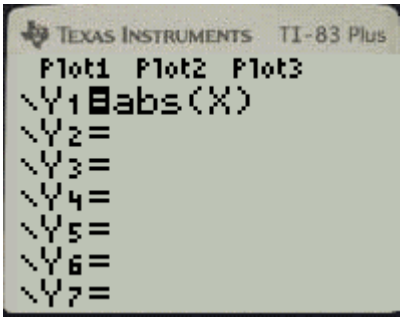


Vertex:

By Calculator:







Parent Function: The simplest form of a family of functions. **Ex:** $y = abs(x)$

1. **Explore:** Plot the following functions and record the vertex.

Function	Vertex
$y = abs(x + 1)$	
$y = abs(x - 1)$	
$y = abs(x + 2)$	
$y = abs(x - 2)$	

- **Predict:** What happens when we add a number to x?

- **Predict:** What happens when we subtract a number from x?

2. **Explore:** Plot the following functions and record the vertex.

Function	Vertex
$y = abs(x) + 1$	
$y = abs(x) - 1$	
$y = abs(x) + 2$	
$y = abs(x) - 2$	

- **Predict:** What happens when we add a number to a function?

- **Predict:** What happens when we subtract a number from a function?

3. **Explore:** Plot the following functions and record your observed changes.

Function	Observation
$y = \frac{1}{2} * abs(x)$	
$y = -\frac{1}{2} * abs(x)$	
$y = 2 * abs(x)$	
$y = -2 * abs(x)$	

- **Predict:** What happens when we multiply our function by a number bigger than 1?

- **Predict:** What happens when we multiply our function by a number smaller than 1?

- **Predict:** What happens when we multiply our function by a negative number?

4. **What would happen if we multiplied x by a number?**

Transformations Reference Sheet!!!

1. $\boldsymbol{F(x-h)}$: Horizontal Shift (Left / Right)

   - $F(x+2)$ Shifts Left 2
   - $F(x-2)$ Shifts Right 2

2. $\boldsymbol{F(x)+k}$: Vertical Shift (Up / Down)

   - $F(x)-2$ Shifts Down 2
   - $F(x)+2$ Shifts Up 2

3. $\boldsymbol{a*F(x)}$: Vertical Stretch or Compression (Steepness / Direction)

   - $2*F(x)$ 2 times as steep
   - $\frac{1}{2}*F(x)$ $\frac{1}{2}$ as steep
   - $-F(x)$ Changes direction (Vertical Flip)