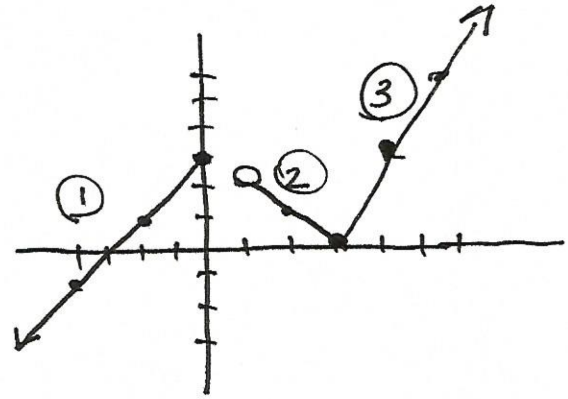
Section 1.7 Piecewise Functions

These functions are comprised of several different equation types all of which have unique graphs.

A) Different equations used for different intervals of the domain

$$h(x) = \begin{cases} x+3 & \text{if } x \le 0 \\ 3-x & \text{if } 1 < x \le 3 \\ 3(x-3) & \text{if } x > 3 \end{cases}$$



①

x	h(x)
0	3
-2	1
-4	-1

②

x	h(x)
1	2
2	1
3	0

③

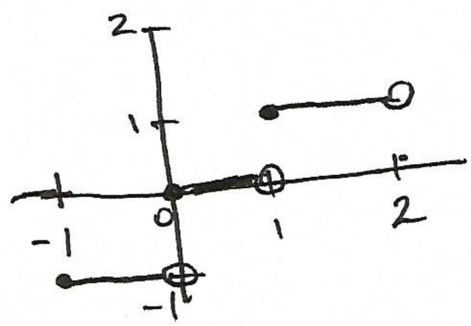
x	h(x)
3	0
4	3
5	6

B) Greatest integer Function - This function is also called the step function.

$f(x) = [[x]]$

The double bracket is the symbol used for the greatest integer function. This function holds a constant value for the range over multiple value domain which makes a graph that looks like a step.

x	f(x)
-1	-1
-0.9	-1
-0.5	-1
-0.1	-1
0	0
0.2	0
0.5	0
0.9	0
1.0	1
1.1	1
1.5	1
1.9	1
2.0	2



c) Absolute Value Function – The absolute value of a number is always nonnegative. The domain of the graph includes all real numbers while the range includes only nonnegative real numbers. The graph has the V-shape and the vertex is located by setting the function expression in the absolute value symbol equal to zero and solve for the variable.

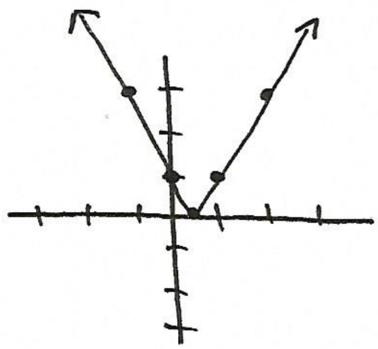
$f(x) = |2x-1|$

$2x-1=0$

$2x=1$

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

x	$f(x)$
$\frac{1}{2}$	0
0	1
1	1
-1	3
2	3



This function also is noted for its symmetry to a vertical line that passes through the x-value of the vertex. This is evident by choosing domain values that are equidistant from the vertex point.

Ex. $0 \rightarrow \frac{1}{2} \leftarrow 1$

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

This causes repeated range values for both domain values.

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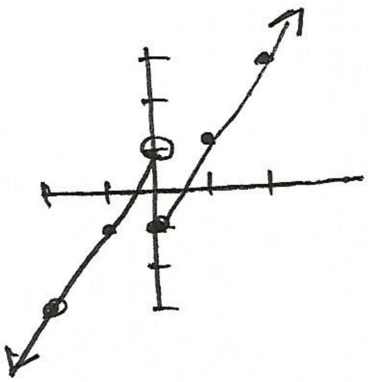
11. $f(x) = \begin{cases} 2x+1 & x<0 \\ 2x-1 & x \geq 0 \end{cases}$

x	f(x)
0	1
-1	-1
-2	-3

x	f(x)
0	-1
1	1
2	3



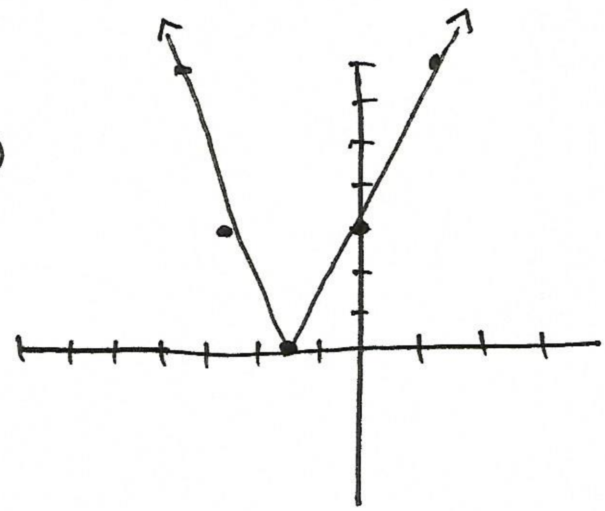
14. $g(x) = |2x+3|$

$2x+3=0$

$2x=-3$

$x = \frac{-3}{2} = -1\frac{1}{2}$

x	g(x)
$-1\frac{1}{2}$	0
-3	3
0	3
-5	7
+2	7



18. $f(x) = [[-3x]]$

x	f(x)
-2	6
-1	3
0	0
1	-3
2	-6