Name: Key.

Math 20-1
Absolute Value and Reciprocal Functions
Assignment 1: Absolute Value Functions

1. Evaluate.

a. $-\lvert-7\rvert$ -7	b. $\lvert-8\rvert$ 8	c. $\lvert 16-25\rvert$ 9	d. $\lvert 12-22\rvert$ 10
e. $\lvert-23\rvert+\lvert 15\rvert$ 38	f. $\lvert 3\rvert-\lvert 9\rvert$ -6	g. $\lvert 3-9\rvert$ 6	h. $-\lvert-\sqrt{81}\rvert$ -9
i. $-\lvert\sqrt[3]{27}\rvert$ -3	j. $\lvert-\sqrt[3]{27}\rvert$ 3	k. $\lvert\sqrt[3]{-27}\rvert$ 3	l. $\lvert-\sqrt[3]{-27}\rvert$ 3

2. Write the following absolute value functions as piecewise functions.

a. $f(x) = \lvert x\rvert$ $f(x) = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$	b. $f(x) = \lvert x+1\rvert$ $f(x) = \begin{cases} x+1, & x \geq -1 \\ -x-1, & x < 1 \end{cases}$
c. $f(x) = \lvert x-2\rvert$ $f(x) = \begin{cases} x-2, & x \geq 2 \\ -x+2, & x < 2 \end{cases}$	d. $f(x) = \lvert 3-x\rvert$ $f(x) = \begin{cases} 3-x, & x \leq 3 \\ -3+x, & x > 3 \end{cases}$

e. $f(x) = |2x + 1|$

$$f(x) = \begin{cases} 2x+1, & x \geq \frac{1}{2} \\ -2x-1, & x < \frac{1}{2} \end{cases}$$

f. $f(x) = |4x - 1|$

$$f(x) = \begin{cases} 4x-1, & x \geq \frac{1}{4} \\ -4x+1, & x < \frac{1}{4} \end{cases}$$

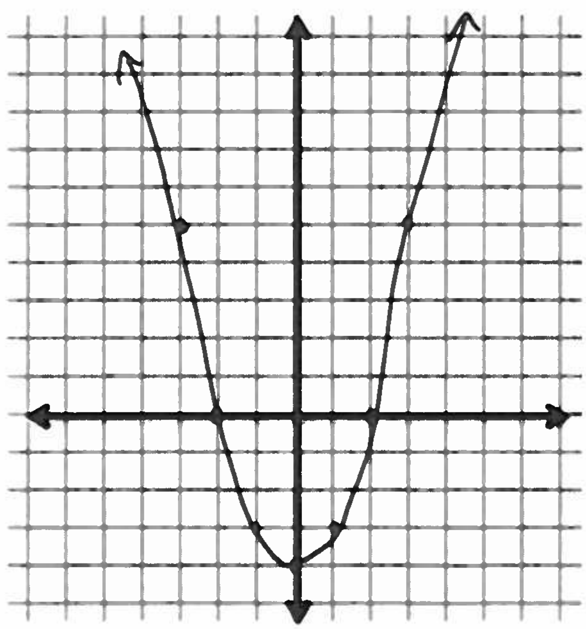
3.

a. Consider the function $g(x) = x^2 - 4$, whose graph has an equation $y = x^2 - 4$

Complete the table of values

x	-4	-3	-2	-1	0	1	2	3	4
y	12	5	0	-3	-4	-3	0	5	12

Plot the points on the grid, join the points and extend the graph.

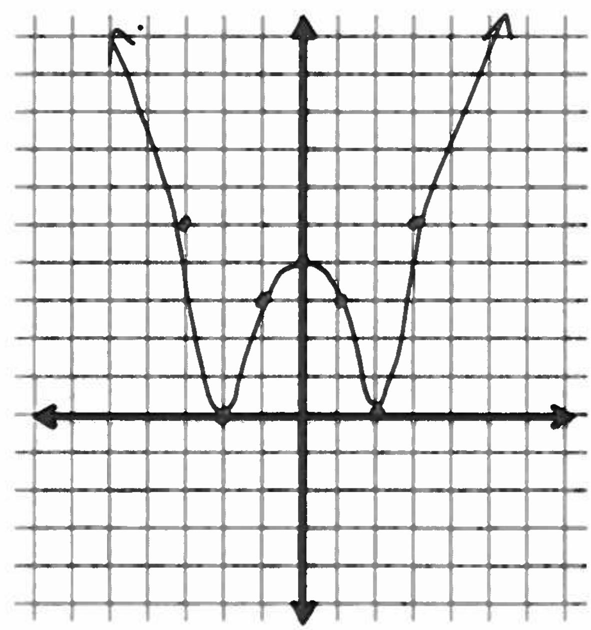


b. Consider the function $g(x) = |x^2 - 4|$, whose graph has an equation $y = |x^2 - 4|$

Complete the table of values

x	-4	-3	-2	-1	0	1	2	3	4
y	12	5	0	3	4	3	0	5	12

Plot the points on the grid, join the points and extend the graph.



c. The function $f(x) = |x^2 - 4|$ can be written as a piecewise function in 3 pieces. Complete the piecewise function for $f(x) = |x^2 - 4|$ shown.

$$fx = \begin{cases} x^2-4, & x < -2 \\ -x^2+4 & -2 \leq x \leq 2 \\ x^2-4, & x > 2 \end{cases}$$

4. Write the following absolute value functions as piece wise functions.

a. $f(x) = |x^2 - 25|$

x-int = ± 5

$$f(x) = \begin{cases} x^2 - 25, & x < -5 \\ -x^2 + 25 & -5 \leq x \leq 5 \\ x^2 - 25, & x > 5 \end{cases}$$

b. $f(x) = |36 - x^2|$ x-int = ± 6

$$f(x) = \begin{cases} -36 + x^2, & x < -16 \\ 36 - x^2, & -6 \leq x \leq 6 \\ -36 + x^2, & x > 6 \end{cases}$$

5. Explain why the function $f(x) = |x^2 + 4|$ can be written, without absolute value symbols, as only a single piece.

Since x^2+4 is positive for all values of x, $|x^2+4|$ can be written as x^2+4 for $x \in \mathbb{R}$