Graph these piecewise functions.

1. \[ f(x) = \begin{cases} x^2, & \text{if } x > 0 \\ 3, & \text{if } x = 0 \\ x, & \text{if } x < 0 \end{cases} \]

2. \[ f(x) = \begin{cases} |x|, & \text{if } -2 < x < 2 \\ x, & \text{if } |x| \geq 2 \end{cases} \]

3. Definition of absolute value (sophisticated):

\[ |x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases} \]

4. Define \( f(x) = |x-4| \) as a piecewise function.

\[ f(x) = \begin{cases} x-4, & x \geq 4 \\ -x+4, & x < 4 \end{cases} \]

5. Use the definition of absolute value to write as a piecewise function and graph:

\[ |x-2| = \begin{cases} x-2, & x \geq 2 \\ -(x-2), & x < 2 \end{cases} \]

\[ |x+3| = \begin{cases} x+3, & x \geq -3 \\ -(x+3), & x < -3 \end{cases} \]

\[ f(x) = \begin{cases} 3, & x \leq -3 \\ -x+2+3, & -3 < x < 2 \\ f(x) = -2x-1, & x \geq 2 \end{cases} \]

\[ f(x) = \begin{cases} 5, & -3 < x < 2 \\ f(x) = 2x+1, & x \geq 2 \end{cases} \]

6. Make some predictions about the graph of this function. Where will it turn? How many flat regions do you expect? What effect is negative sign in the middle going to have?

\[ f(x) = |x+2| - |x-1| \]
7. If you define **slope** in this way, it will help you as we get to the notions of calculus.

\[
\text{slope} = \frac{\text{rate of change of } y \text{ with respect to } x}{\text{change in } y \text{ over change in } x}
\]

\[
m = \frac{\Delta y}{\Delta x}
\]

8. What are three forms of linear equations and their names?

- **Standard Form**: \(Ax + By = C\)
- **slope-intercept**: \(y = mx + b\)
- **point-slope**: \(y - y_1 = m(x - x_1)\)

9. (a) What is the notation for greatest integer function?

\[y = [x]\]

(b) Explain greatest integer function.

(c) Give one everyday example of this function. postage, grades, real population, age!

10. Can you write (easily) the equations of parallel and perpendicular lines?

(a) Find the equation of a line that passes through \((2, -5)\) and is parallel to \(y = \frac{2}{3}x + 6\).

\[-m = -\frac{2}{3}\]

\[y + 5 = -\frac{2}{3}(x - 2)\]

(b) Write the equation of a line that is perpendicular to \(2x - 5y = -6\) and passes through \((-4, 1)\).

- **negative reciprocal (opposite)**

\[m = -\frac{5}{2}\]

\[y - 1 = -\frac{5}{2}(x + 4)\]

\[-5y = -2x - 6\]

\[y = \frac{2}{5}x + \frac{6}{5}\]

\[m = \frac{2}{5}\]

due Thursday: A. 3 - page 9 - 70, 9, 14, 20, 43
page 18 - 42, 46, 61, 62

When doing homework, use pencil, copy all problems, and show all work in order to receive credit.