Evaluating and Graphing Piecewise Functions
Section 3-2d

It is possible to graph anything that you can draw on a piece of paper. In order to do that, however, we'll need to know how to graph what is called piecewise functions.

A piecewise function can look like this:

\[
f(x) = \begin{cases} 
  3x + 2 & \text{if } x \geq 1 \\ 
  x^2 & \text{if } x < 1 
\end{cases}
\]

(a piece of a line) (a piece of the squaring function)

And its graph would look like this:

Sometimes, you will be asked to evaluate a piecewise function. For example, find \( f(3) \), \( f(0) \), \( f(-2) \) in the function:

\[
f(x) = \begin{cases} 
  3x + 2 & \text{if } x \geq 1 \\ 
  x^2 & \text{if } x < 1 
\end{cases}
\]
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Now you try. Find \( g(-5), g(2), g(4) \) if 

\[
g(x) = \begin{cases} 
|x - 5| & \text{if } x \leq -3 \\
2x & \text{if } -3 < x \leq 2 \\
x - 2 & \text{if } x > 2 
\end{cases}
\]

Now, graph 

\[
g(x) = \begin{cases} 
|x - 5| & \text{if } x \leq -3 \\
2x & \text{if } -3 < x \leq 2 \\
x - 2 & \text{if } x > 2 
\end{cases}
\]
The other task you’ll need to be able to do is to rewrite an absolute value equation as a piecewise function.

For example, rewrite $f(x) = |2x - 3|$ as a piecewise function.

First, rewrite the function without the absolute value symbols.

Then, to find the restrictions on the domain, set the expression INSIDE the absolute value symbol equal to zero and solve for $x$.

Then, put the ___________ domain restriction on the positive branch of your piecewise function and put the _______________ domain restriction on the negative branch of your piecewise function.