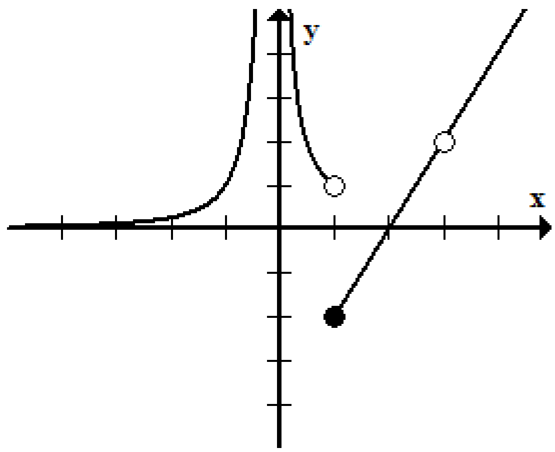
1.3 Piecewise Functions

Ok, let's just take a look at a piece-wise graph.



Graph 1.1

Now a piece-wise function is just one large function $f(x)$ made up of smaller functions on different parts of the domain.

Example 1.3.

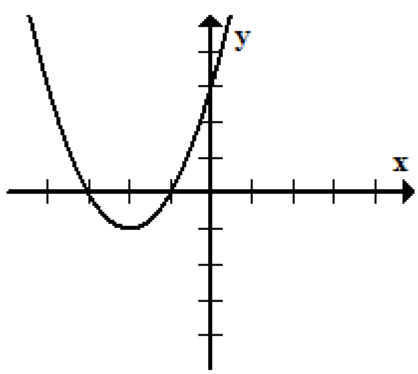
$$f(x) = \begin{cases} \frac{1}{x^2}, & x < 0 \\ \frac{1}{x}, & 0 < x < 1 \\ 2x - 4, & [1,3) \cup (3, \infty) \end{cases}$$

There are a couple of ways of graphing a piece-wise function. If it's your first time or you haven't done it in a while, just graph all the functions and then erase the part that doesn't count (i.e. when it's not in its part of the domain).

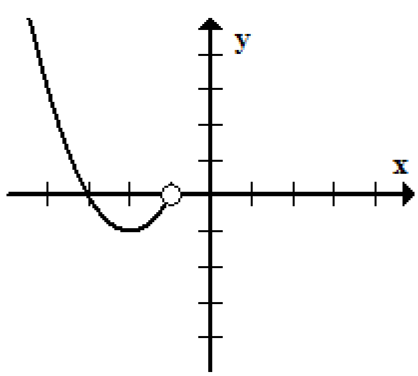
Example 1.4. Graph $f(x) = \begin{cases} (x+2)^2 - 1, & x < -1 \\ 2, & x = -1 \\ -2x + 3, & -1 < x < 1 \\ \sqrt{x}, & x \geq 1 \end{cases}$

We need to take this one piece at a time. Get it... one 'piece.' You know... because it's a piece-wise function. Ok moving on!

1. Let's start with $(x+2)^2 - 1$. We haven't covered transformations yet, but you probably remember a little bit about transforming $f(x) = x^2$. Let's start with graphing the whole thing.



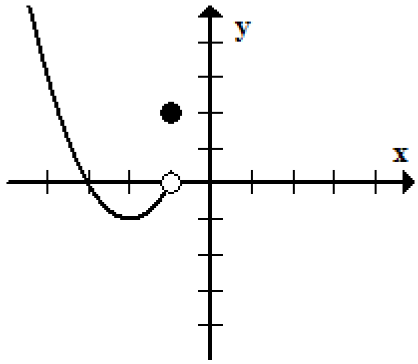
Now erase what we don't need.



It's now restricted to $x < -1$.

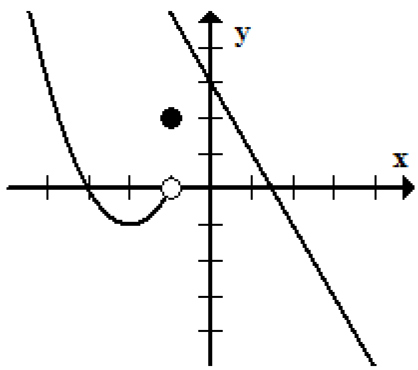
Note the open dot at $(-1, 0)$. It's open because the interval does not include $x = -1$.

2. Next up...2?. What this really means is when $x = -1$, the y-value is 2. It's just a closed point on the graph.

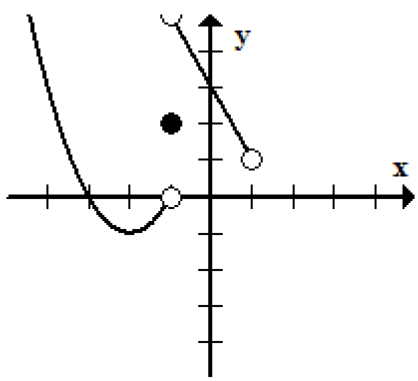


All we did here is add the point $(-1, 2)$.

3. On to $-2x + 3$. Let's add that to the graph.

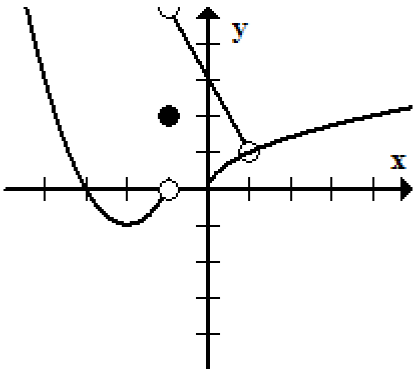


Now erase what we don't need.

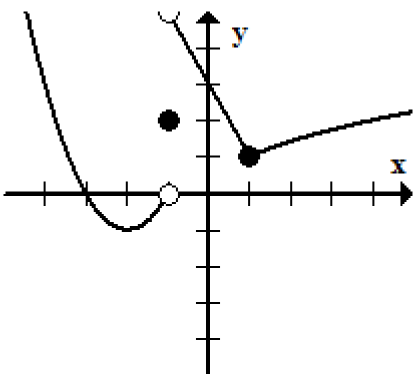


The graph only shows $-2x + 3$ when $-1 < x < -1$.

4. Finally we add $\sqrt{x}$.



Now erase what we don't need.



We are finally done. Notice how that open dot at $(1, 1)$ is now a closed dot.