

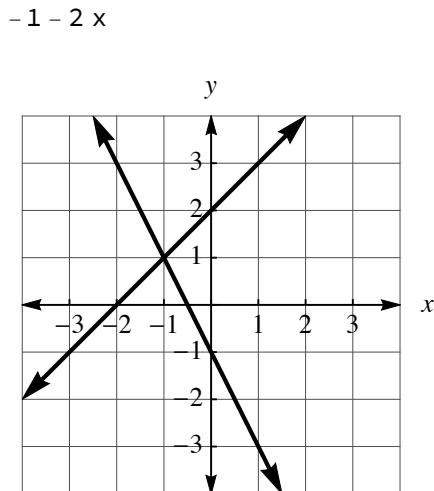
Introduction to Piecewise Functions

When we can restrict the domain of function, it becomes possible to combine functions and still have a function. To explain further, let's think about two linear functions:

$$f(x) = x + 2$$

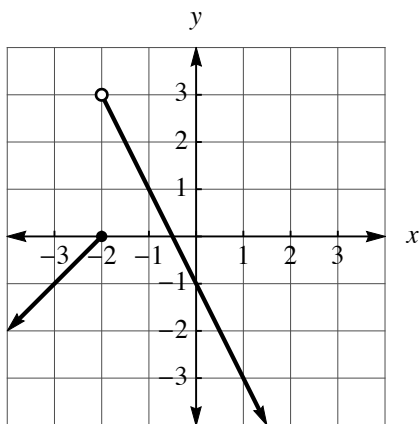
$$g(x) = -2x - 1$$

Here are these two functions graphed on the same coordinate plane:



When we graph two linear functions on the same graph, we know longer have a function because for each valid x value, there are x values for which there is more than one possible y value.

However, if we restrict the domain of each function so that they do not overlap, we will have a function. For example, we can turn our two lines in the graph above into two rays, one that includes an x value of -2 and one that does not:



Using our notation for the equation of a ray, we can write the equations for these two rays:

$$f(x) = x + 2 \quad \text{and} \quad x \leq 2$$

$$g(x) = -2x - 1 \quad \text{and} \quad x > 2$$

But since these two functions when combined on a graph form two pieces of a single function, we can combine them into a single function with some fancy notation:

$$h(x) = \begin{cases} x + 2 & x \leq 2 \\ -2x - 1 & x > 2 \end{cases}$$