

Domain and range from a graph

The domain is all x -values or inputs of a function, and the range is all y -values or outputs of a function. When looking at a graph, the domain consists of the x -coordinates of all the points of the graph. The range consists of the y -coordinates of all the points of the graph.

There are a few functions we'll use a lot that have domain restrictions:

$$y = \frac{1}{x}$$

x cannot equal 0, also written as $x \neq 0$

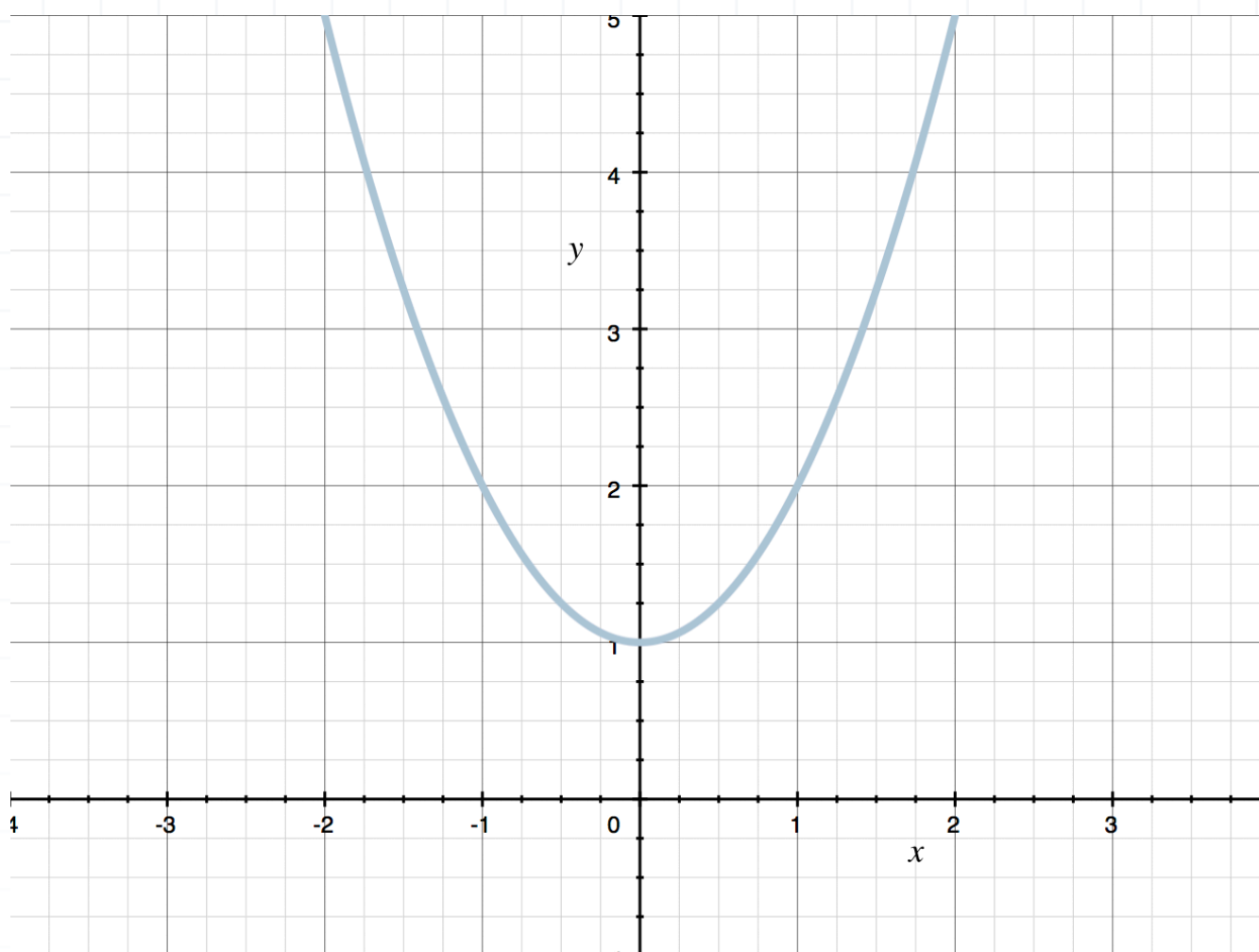
$$y = \sqrt{x}$$

x must be nonnegative (either positive or 0), also written as $x \geq 0$

Example

What are the domain and range of the function? Assume the graph does not extend beyond what's shown.





Let's start with the domain. Remember that the domain consists of the x -coordinates of all the points of the graph.

Start by looking at the leftmost point of the graph (the point that's the farthest to the left). The x -coordinate of the leftmost point is -2 . Now trace the graph until you get to the rightmost point (the point that's the farthest to the right). The x -coordinate of the rightmost point is 2 . There are no breaks in the graph going from the leftmost point to the rightmost point, which means that the domain consists of -2 , 2 , and everything between those values, which is also written as $-2 \leq x \leq 2$.

Domain: $-2 \leq x \leq 2$



Next, let's find the range. Remember that the range consists of the y -coordinates of all the points of the graph.

Look at the lowest point of the graph (the point that's the farthest down). The y -coordinate of the lowest point is 1. Now look at how far up the graph goes. The graph has its two highest points (points that are the farthest up). The x -coordinates of the highest points are -2 and 2 , but now we're finding the range, so we need to look at the y -coordinate of each of those two points, which is 5. There are no breaks in the graph going from the lowest point to either of the highest points, which means that the range consists of 1, 5, and everything between 1 and 5, which is also written as $1 \leq y \leq 5$.

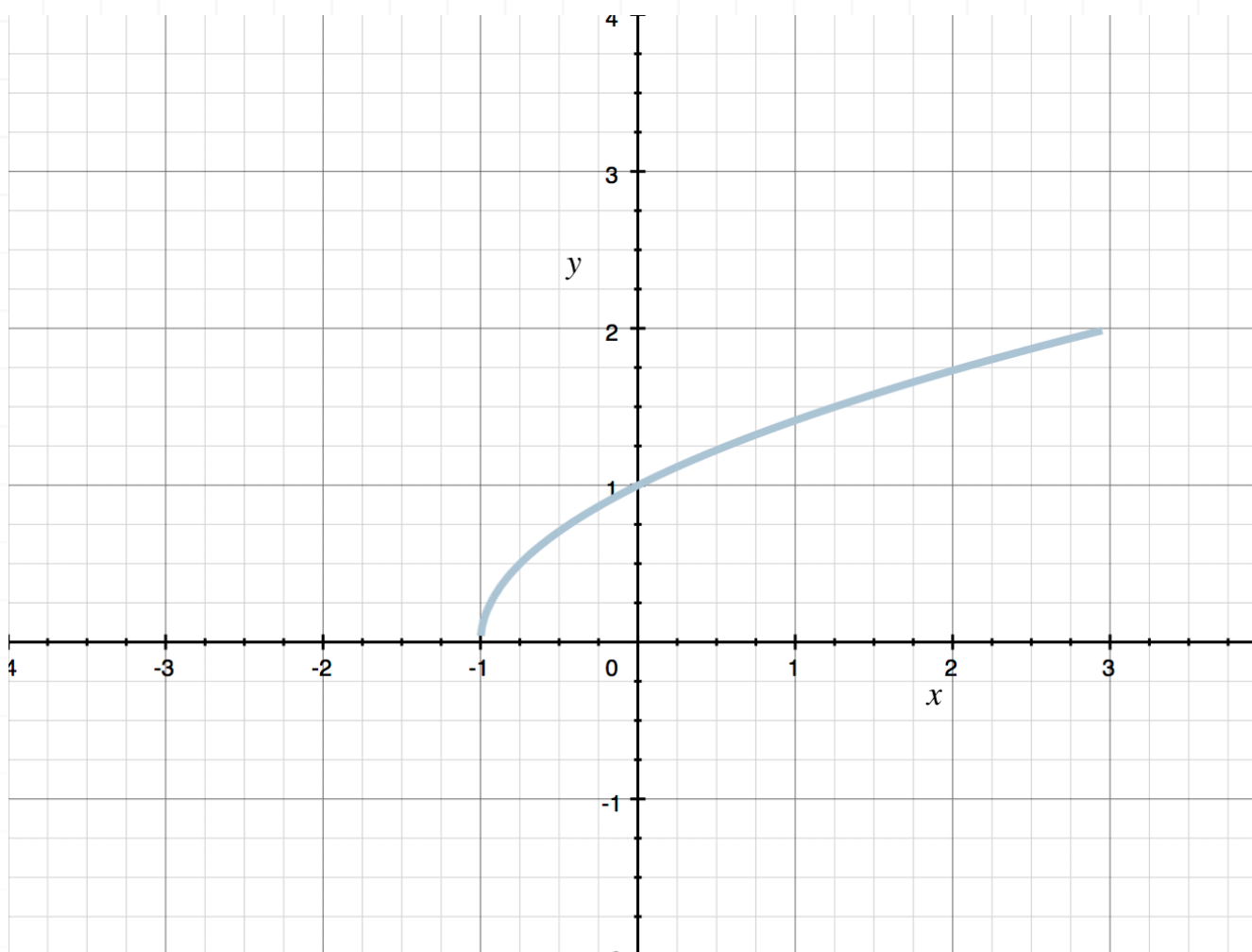
Range: $1 \leq y \leq 5$

Let's try another example of finding domain and range from a graph.

Example

What are the domain and range of the function? Assume the graph does not extend beyond what's shown.





Let's start with the domain. The x -coordinate of the leftmost point is -1 . Now trace the graph until you get to the rightmost point. The x -coordinate of the rightmost point is 3 . There are no breaks in the graph going from the leftmost point to the rightmost point, which means that the domain consists of -1 , 3 , and everything between those values, which is also written as $-1 \leq x \leq 3$.

Domain: $-1 \leq x \leq 3$

Next, let's find the range. Look at the lowest point of the graph. The y -coordinate of the lowest point is 0 . Now look at the highest point of the graph. The y -coordinate of the highest point is 2 . There are no breaks in the graph going from the lowest point to the highest point, which means



that the range consists of 0, 2, and everything between 0 and 2, which is also written as $0 \leq y \leq 2$.

Range: $0 \leq y \leq 2$

