# 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:

$$y = \frac{1}{x}$$
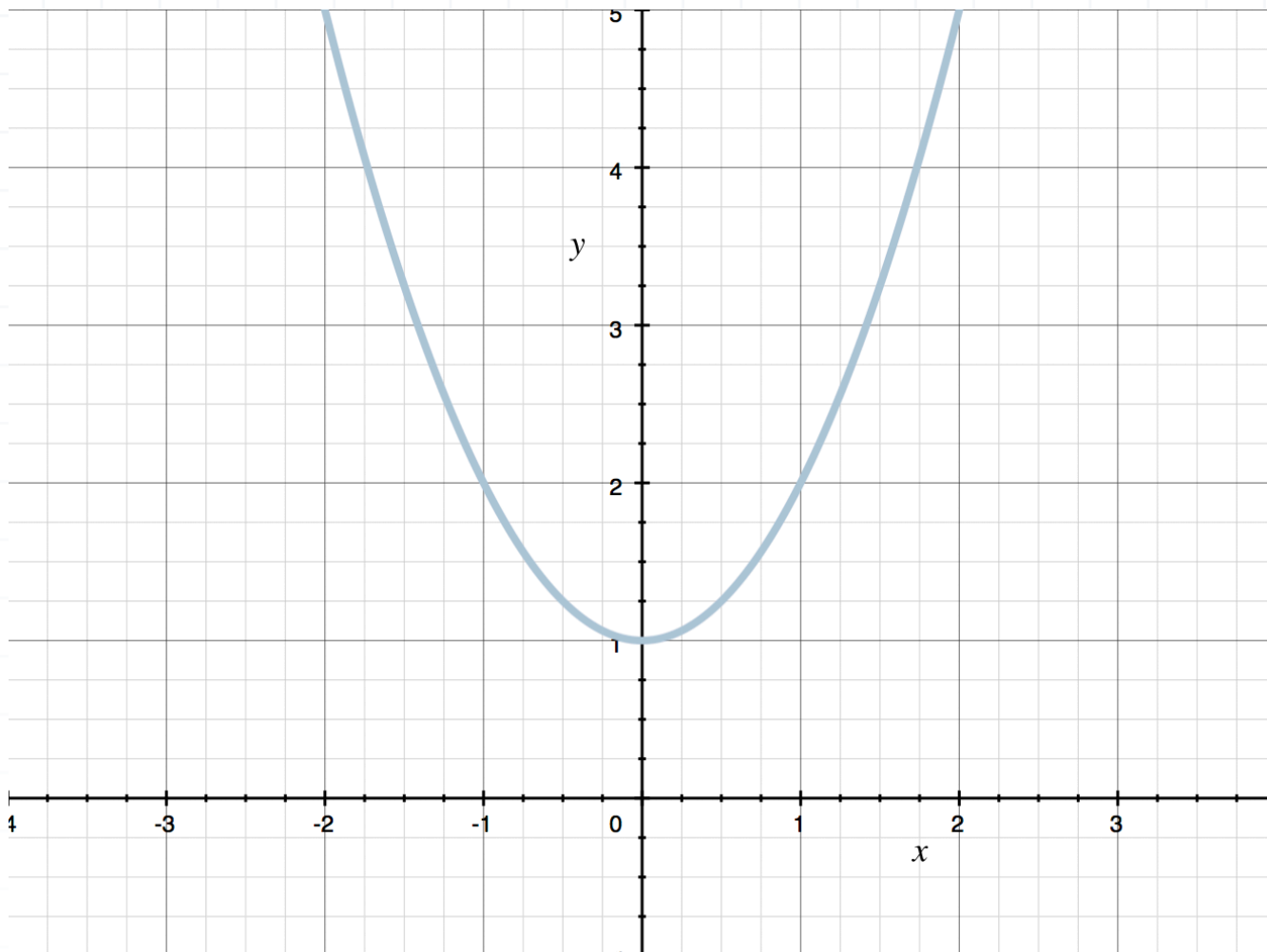$x$ cannot equal $0$, also written as $x \neq 0$

$$y = \sqrt{x}$$
$x$ 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 $1 \leq y \leq 5$.
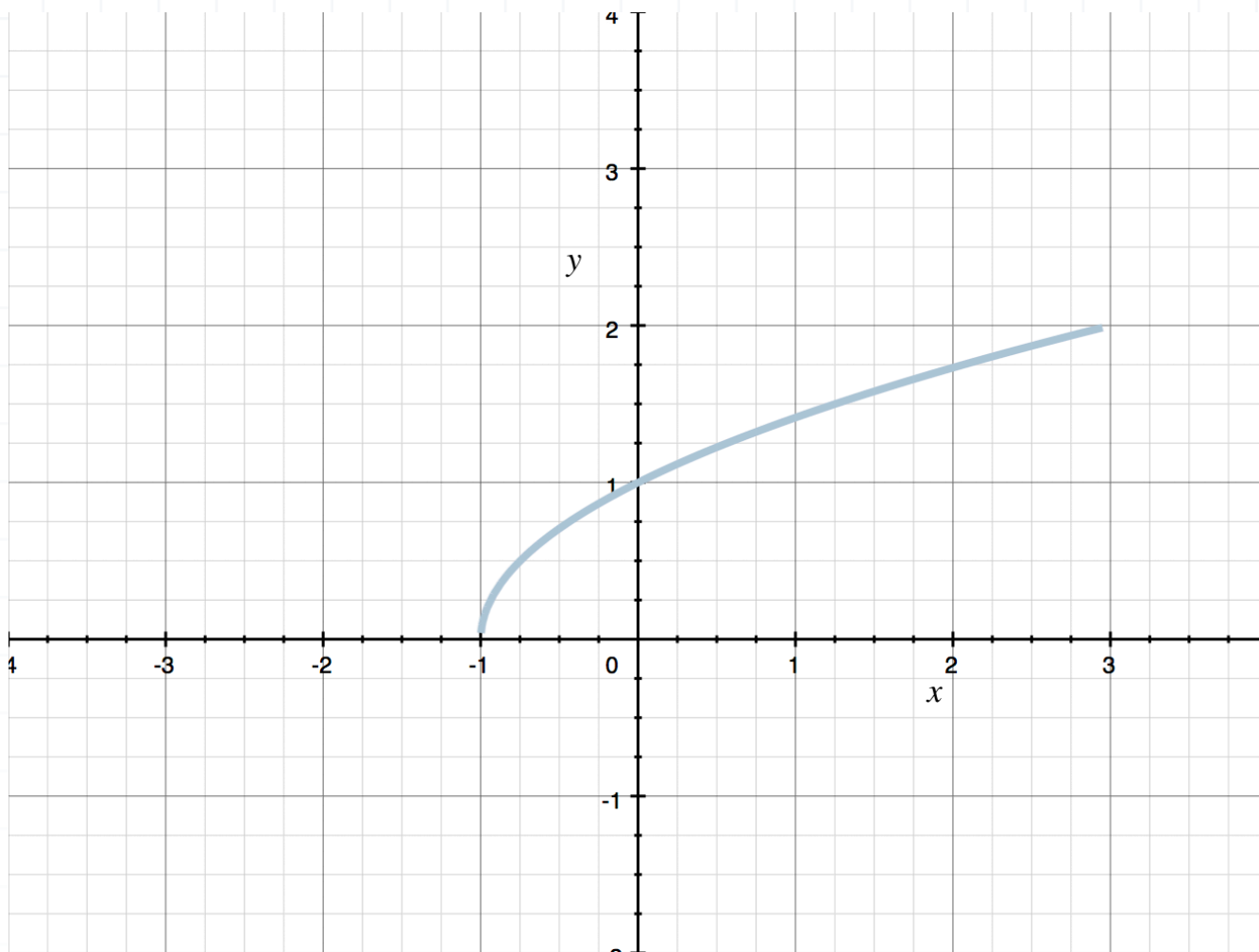
Range: $1 \leq y \leq 5$

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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:** $0 \leq y \leq 2$