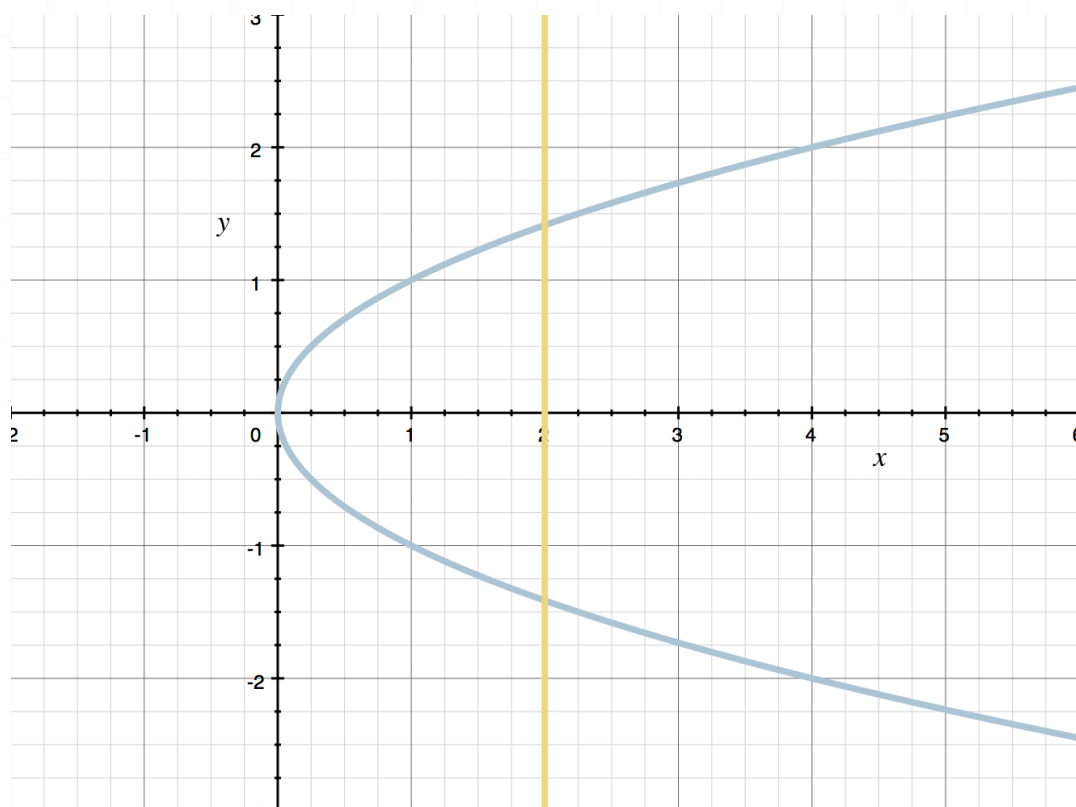


Vertical Line Test

If an equation is a function, then its graph will pass the Vertical Line Test. The **Vertical Line Test** (VLT) says that a graph represents a function if no perfectly vertical line crosses the graph more than once.

The graph below doesn't pass the Vertical Line Test because we can draw a vertical line that intersects it more than once. It takes only one vertical line intersecting the graph more than once for it to fail the Vertical Line Test.



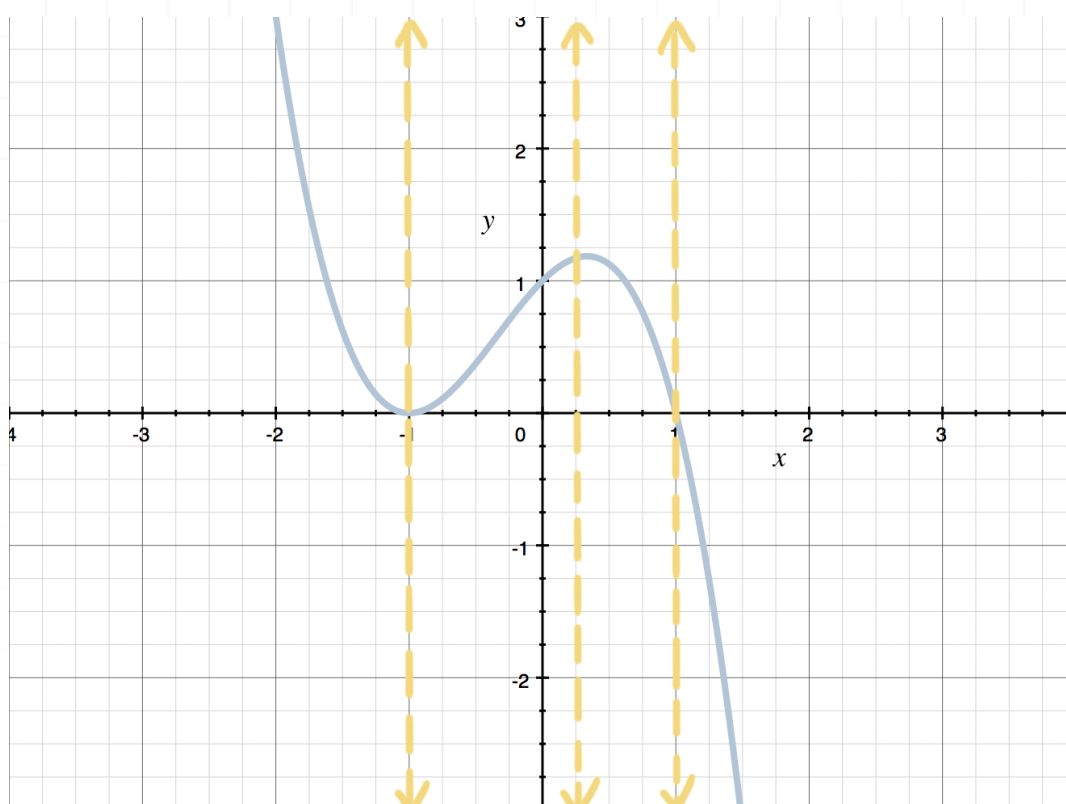
So, even if we can sketch a line or lines that only intersect the graph in one place, we only need to find one vertical line that intersects the graph multiple times in order for the graph to fail the VLT.

The reasoning behind the Vertical Line Test comes from the one-input-one-output rules for functions that we've already learned. If we can find a vertical line that crosses the graph more than once, it means there are



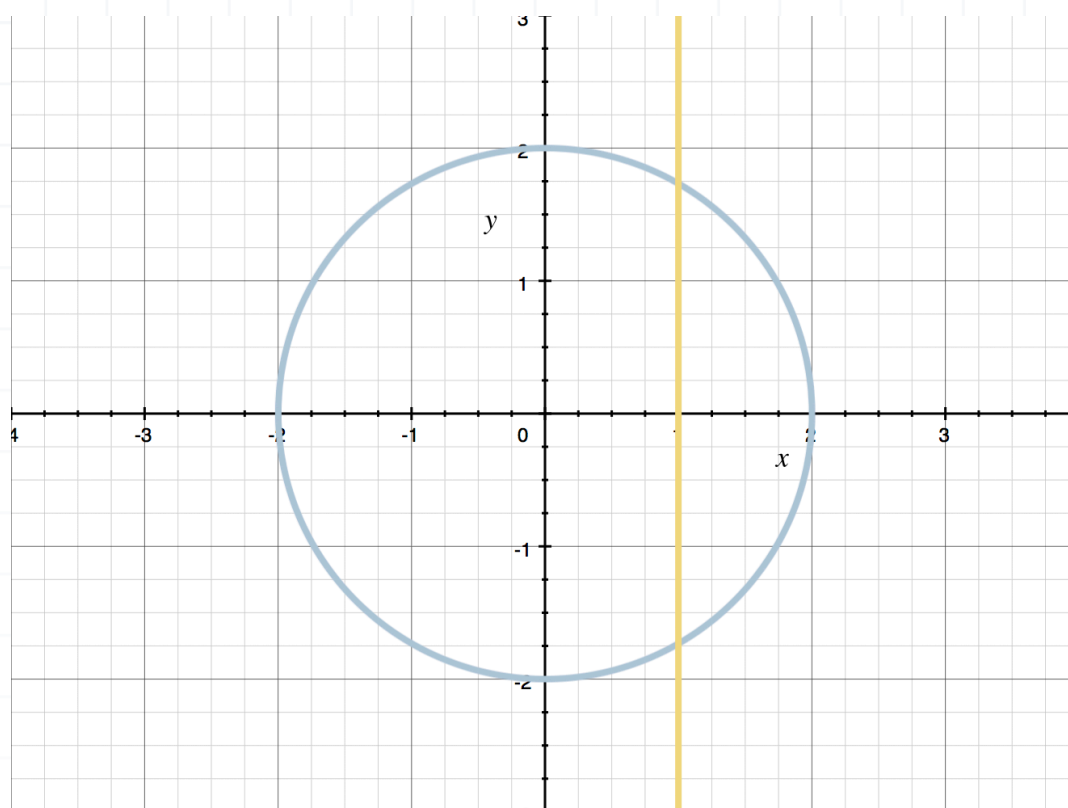
multiple output values for the single input value, and therefore we know that the graph doesn't represent a function.

This graph passes the Vertical Line Test, so it represents a function. Any vertical line we can draw will cross the graph no more than once.



We know that the circle below doesn't represent a function, because any vertical line we draw at some x that's strictly between -2 and 2 (not "right at" -2 or 2) will cross the graph twice, which causes the graph to fail the Vertical Line Test. In fact, circles can never represent functions, because they never pass the Vertical Line Test.





Let's do an example.

Example

How many times can a vertical line touch a graph in order for it to pass the Vertical Line Test?

Every vertical line can touch a graph at most once in order for the graph to pass the Vertical Line Test. If a graph passes the Vertical Line Test, it's the graph of a function.

Let's do an example where we sketch a few functions that pass the Vertical Line Test.

Example



Create a graph that represents a function and explain why it's a function.

There are an infinite number of functions we could sketch, so we just need to sketch one that passes the Vertical Line Test. Any vertical line can touch the graph at most once. Below are some examples of graphs of functions.

