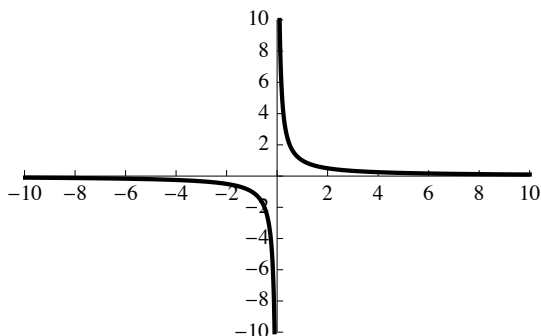
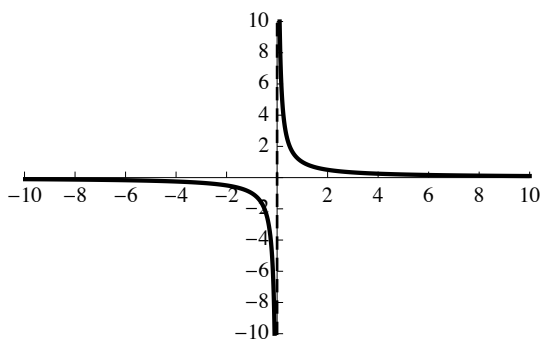


## Vertical Asymptotes

In the previous set of notes, we saw a very special behavior of a graph: as the positive  $x$  values got closer and closer to 0, the  $y$  values got closer and closer to  $+\infty$ , and as the negative  $x$  values got closer and closer to 0, the  $y$  values got closer and closer to  $-\infty$ . Here is that graph, again:



To highlight this behavior, mathematicians draw a vertical dashed line to indicate that the graph approaches this line, but does not touch it:



While this line looks similar to the “fence” we draw for piecewise functions, it has its own special name: a *vertical asymptote*.

And this vertical asymptote, since it is a vertical line, has an equation:

$$x = 0$$

Here is an example of a function with a vertical asymptote at  $x = 3$ :

