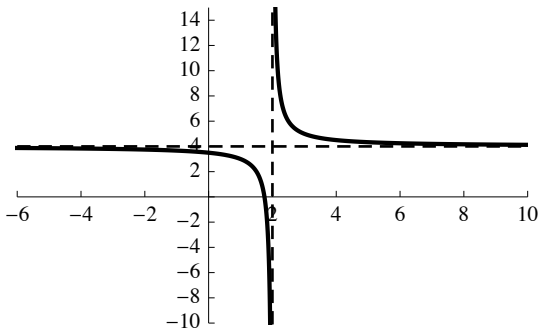


## End Behavior of a Function

In the previous set of notes, we saw a function that had one horizontal asymptote:



We also noted that as the  $x$  values got larger (closer to  $+\infty$ ), the  $y$  values got closer to 4. And as the  $x$  values got smaller (closer to  $-\infty$ ), the  $y$  values also got closer to 4. This behavior of the  $y$  values, as  $x$  approaches  $+\infty$  and as  $x$  approaches  $-\infty$ , is known as the *end behavior* of the function.

More formally, the end behavior of a function is written with special arrow notation. For the end behavior of the function above we would write:

$$\text{As } x \rightarrow +\infty, y \rightarrow 4$$

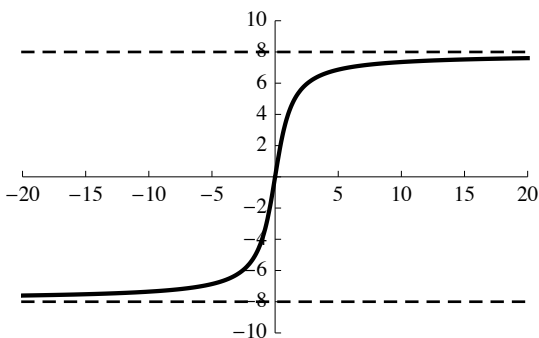
$$\text{As } x \rightarrow -\infty, y \rightarrow 4$$

In words, we read this as:

- As  $x$  approaches infinity,  $y$  approaches 4, and
- As  $x$  approaches negative infinity,  $y$  approaches 4.

### Another Example

Let's consider this graph, which has two horizontal asymptotes:



It's end behavior is:

$$\text{As } x \rightarrow +\infty, y \rightarrow 8$$

$$\text{As } x \rightarrow -\infty, y \rightarrow -8$$