

Pre-Calculus CP 1 – Sketching Graphs based on Limits Name: _____

We already know that

- we find limits as x goes to infinity using the same rules we learned for horizontal asymptotes
- if we are finding a limit to a number and the result is either infinity or negative infinity, then we are encountering a vertical asymptote

Let's use these facts to sketch some graphs without an equation, but with some information regarding the limits of the function we are trying to graph.

First let's practice finding some visual limits again....

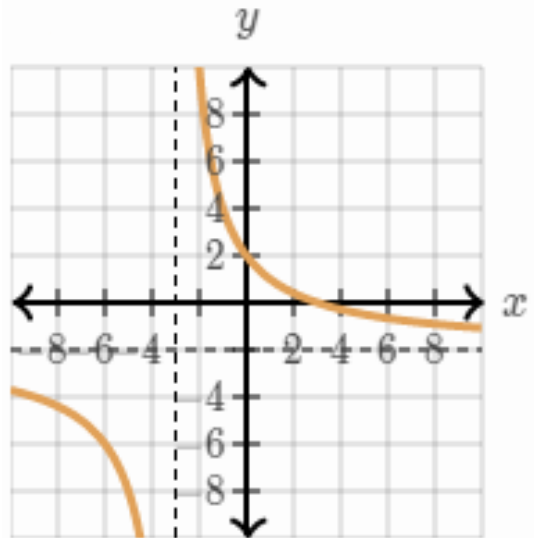
$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow -3^+} f(x) =$$

$$\lim_{x \rightarrow -3^-} f(x) =$$

$$\lim_{x \rightarrow -3} f(x) =$$



$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow -2^+} f(x) =$$

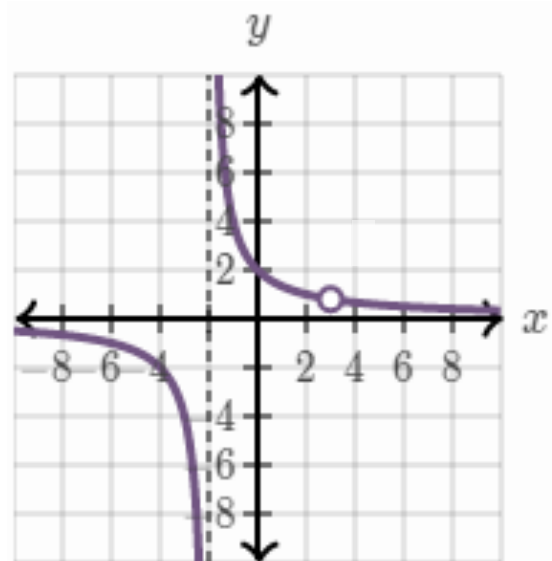
$$\lim_{x \rightarrow -2^-} f(x) =$$

$$\lim_{x \rightarrow -2} f(x) =$$

$$\lim_{x \rightarrow 3^-} f(x) =$$

$$\lim_{x \rightarrow 3^+} f(x) =$$

$$\lim_{x \rightarrow 3} f(x) =$$



Sketching Graphs based on Limits

Now let's see if we can turn it around and use the limits to sketch a possible graph!

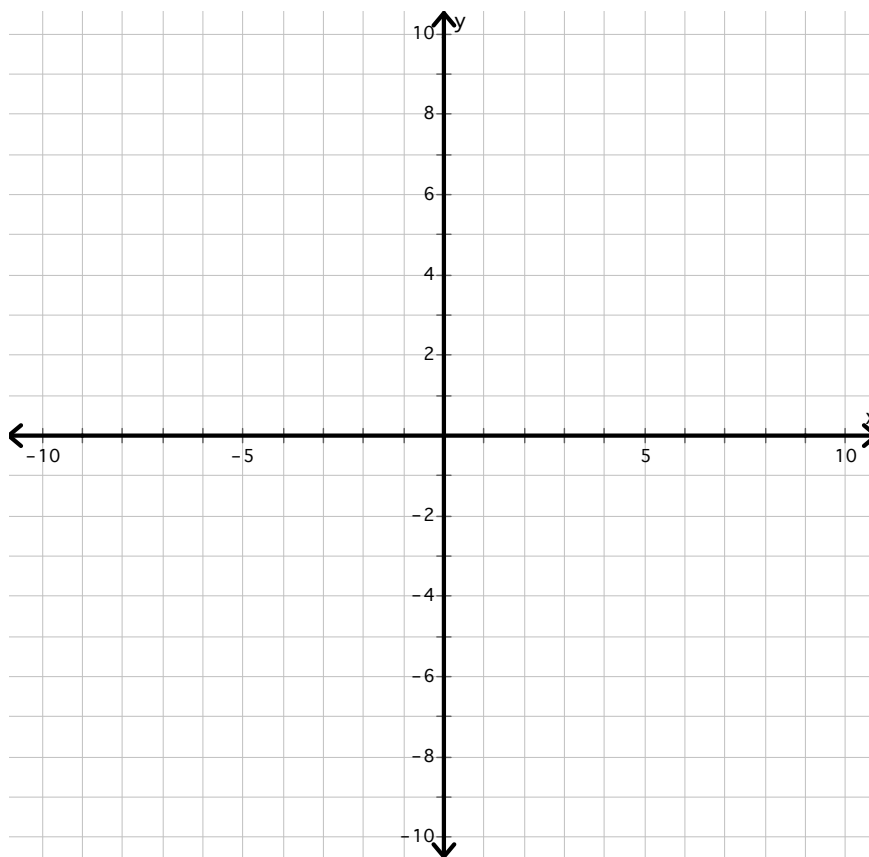
Sketch a possible graph for the conditions below, assuming $f(x)$ does not cross a horizontal asymptote:

$$1) \lim_{x \rightarrow \infty} f(x) = 2$$

$$\lim_{x \rightarrow -\infty} f(x) = 2$$

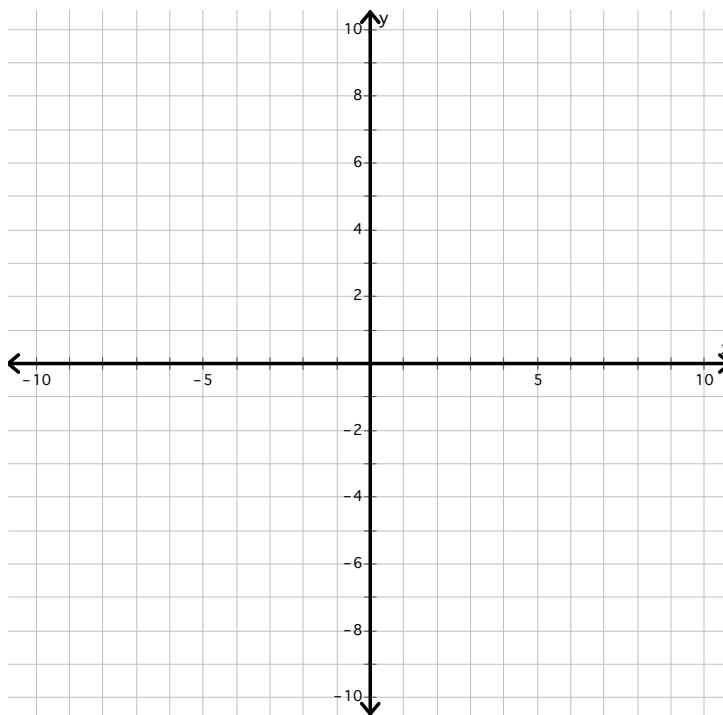
$$\lim_{x \rightarrow 3^-} f(x) = \infty$$

$$\lim_{x \rightarrow 3^+} f(x) = \infty$$



Sketching Graphs based on Limits

2) $f(-3)$ exists, $\lim_{x \rightarrow -3^-} f(x)$ exists and equals $f(-3)$, but, $\lim_{x \rightarrow -3} f(x)$ does not exist



3) $f(x) = 0$ at $x = 2$

$$\lim_{x \rightarrow \infty} f(x) = -2$$

$$\lim_{x \rightarrow -\infty} f(x) = -2$$

$$\lim_{x \rightarrow 4^+} f(x) = -\infty$$

$$\lim_{x \rightarrow 4^-} f(x) = \text{DNE}$$

Crosses y-axis at -1

$f(x)$ is undefined at $x = -1$ and $x = 4$

