

SECTION 2-2: THE LIMIT OF A FUNCTION

1. DEFINITION: **Two-Sided Limit**

Notation:

Words:

It means:

Evaluate the limits below numerically. Estimate the limit to 4 decimal places, if possible.

2. $\lim_{x \rightarrow 0} \frac{\sin(x)}{x}$

3. $\lim_{x \rightarrow 2} \frac{\cos(x)(x - 2)}{3x^2 - 5x - 2}$

4. $\lim_{x \rightarrow -1} \frac{|x + 1|}{x + 1}$

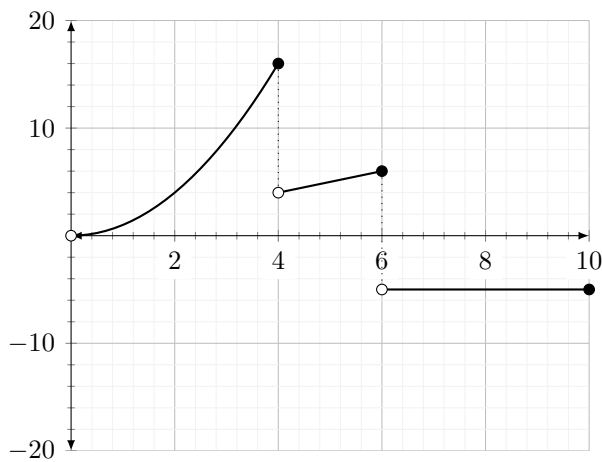
5. $\lim_{x \rightarrow 1} \frac{1}{x - 1}$

6. DEFINITION: **One-Sided Limits**

Notation:

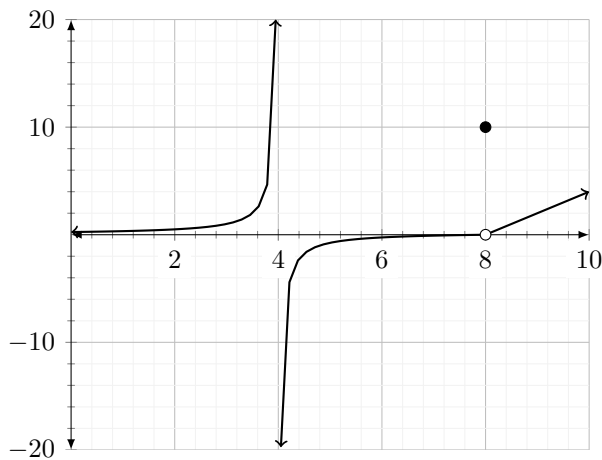
Limits can also be evaluated graphically.

7. The function $g(x)$ is graphed below. Use the graph to fill in the blanks.



- (a) $\lim_{x \rightarrow 4^-} g(x) = \underline{\hspace{2cm}}$
- (b) $\lim_{x \rightarrow 4^+} g(x) = \underline{\hspace{2cm}}$
- (c) $\lim_{x \rightarrow 4} g(x) = \underline{\hspace{2cm}}$
- (d) $g(4) = \underline{\hspace{2cm}}$
- (e) $\lim_{x \rightarrow 8} g(x) = \underline{\hspace{2cm}}$
- (f) $g(8) = \underline{\hspace{2cm}}$

8. The function $h(x)$ is graphed below. Use the graph to fill in the blanks.



- (a) $\lim_{x \rightarrow 4^-} h(x) = \underline{\hspace{2cm}}$
- (b) $\lim_{x \rightarrow 4^+} h(x) = \underline{\hspace{2cm}}$
- (c) $\lim_{x \rightarrow 4} h(x) = \underline{\hspace{2cm}}$
- (d) $h(4) = \underline{\hspace{2cm}}$
- (e) $\lim_{x \rightarrow 8} h(x) = \underline{\hspace{2cm}}$
- (f) $h(8) = \underline{\hspace{2cm}}$

9. Find any vertical asymptotes of $f(x) = \frac{2}{x+5}$ and *justify* your answer using a limit.

10. Sketch the graph of an function that satisfies *all* of the given conditions. Compare your answer with that of your neighbor.

$$\lim_{x \rightarrow 0^-} f(x) = 1 \quad \lim_{x \rightarrow 0^+} f(x) = -2 \quad \lim_{x \rightarrow 4^-} f(x) = 3 \quad \lim_{x \rightarrow 4^+} f(x) = 0$$

$$f(0) = -2$$

$$f(4) = 1$$