SECTION 2-2: THE LIMIT OF A FUNCTION

Read Section 2.2. Work the embedded problems.

1. EXAMPLE 1: What does the function $f(x) = \frac{x-2}{x^2-x-2}$ look like around $x = 2$?

2. EXAMPLE 2: What does the function $f(x) = \frac{2|x-5|}{(x-5)}$ look like around $x = 5$?

3. DEFINITION: two-sided limit

   Say: "the limit of $f(x)$, as x approaches a is L"

   Write:

   It means:

4. DEFINITION: one-sided limits

   - Say: "the limit of $f(x)$, as x approaches a *on the left* is L "

     Write:

     It means:

   - Say: "the limit of $f(x)$, as x approaches a *on the right* is L "

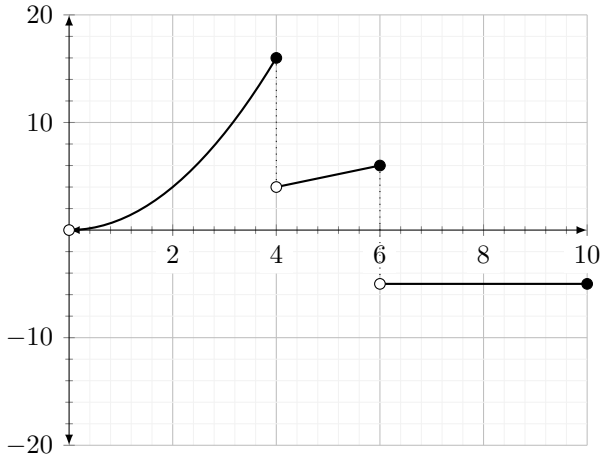
     Write:

     It means:

5. EXAMPLE 3: What does the function $f(x) = \frac{8-x}{(x-2)^2}$ look like around $x = 2$?

6. DEFINITION: infinite limits

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



(a) $\lim_{x \to 4^-} f(x) =$ _____

(b) $\lim_{x \to 4^+} f(x) =$ _____

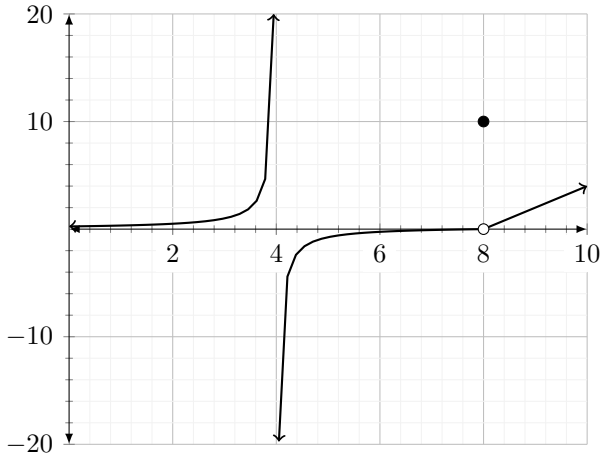
(c) $\lim_{x \to 4} f(x) =$ _____

(d) $f(4) =$ _____

(e) $\lim_{x \to 8} f(x) =$ _____

(f) $f(8) =$ _____

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



(a) $\lim_{x \to 4^-} f(x) =$ _____

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(d) $f(4) =$ _____

(e) $\lim_{x \to 8} f(x) =$ _____

(f) $f(8) =$ _____

Write the equation of any vertical asymptote:

9. What is the relationship between limits and vertical asymptoes?

10. Sketch the graph of an function that satisfies *all* of the given conditions.

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

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

11. Some General Principles

(a) $\lim_{x\to 0^-} \frac{1}{x} =$

(b) $\lim_{x\to 0^+} \frac{1}{x} =$

(c) $\lim_{x\to 0} \frac{1}{x} =$

(d) $\lim_{x\to 0^-} \frac{1}{x^2} =$

(e) $\lim_{x\to 0^+} \frac{1}{x^2} =$

(f) $\lim_{x\to 0} \frac{1}{x^2} =$

(g) $\lim_{x\to a^-} \frac{1}{x-a} =$

(h) $\lim_{x\to a^+} \frac{1}{x-a} =$

(i) $\lim_{x\to a} \frac{1}{x-a} =$