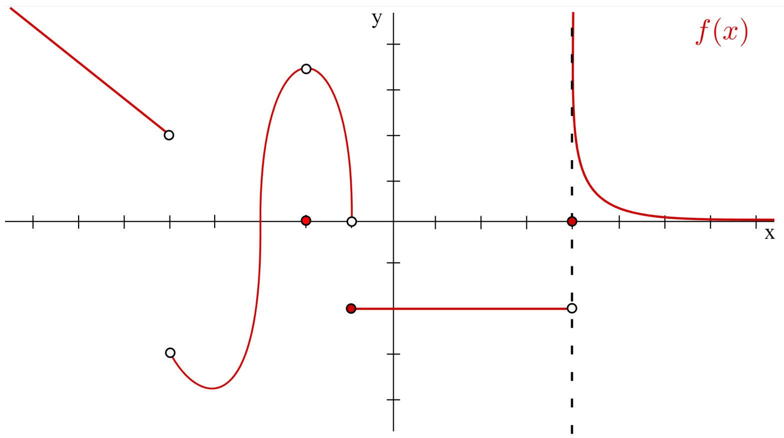
Week-in-Review 1 (1.1, 1.2)

Problem 1. Find the following limits, if they exist, based on the graph of $f(x)$ below:



(1) $\lim_{x\to -6} f(x)$

(2) $\lim_{x\to -5} f(x)$

(3) $\lim_{x\to -2} f(x)$

(4) $\lim_{x\to -1} f(x)$

(5) $\lim_{x\to 0} f(x)$

(6) $\lim_{x\to 4} f(x)$

(7) $\lim_{x\to 7} f(x)$

(8) Find $f(-5), f(-2), f(-1), f(0), f(4)$.

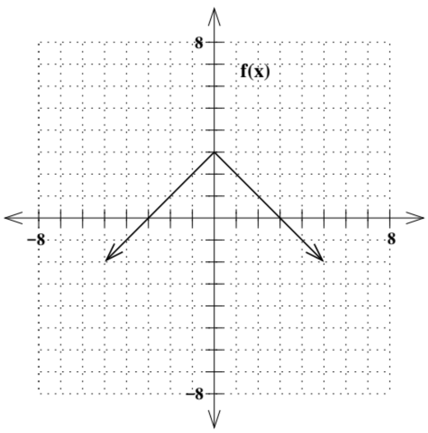
Problem 2. Find the following limits numerically. If a limit does not exist, state this and use the limit notation to describe any infinite behavior.

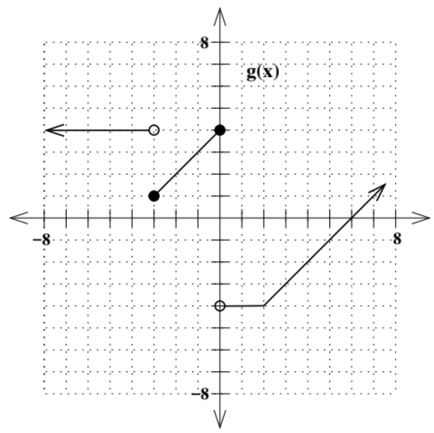
(1) $\lim_{x \to 1} \frac{x^2 - 1}{x - 1}$

(2) $\lim_{x \to 5} \frac{5}{x - 5}$

Problem 3. Find $\lim_{x \to 1} \frac{x^2 - 1}{x - 1}$ algebraically.

Problem 4. Find the following limits, if they exist, based on the graph of $f(x)$ and $g(x)$ below:





(1) $\lim_{x\to 1}[f(x) + g(x)] =$

(2) $\lim_{x\to 2}[f(x)g(x)] =$

(3) $\lim_{x\to 0} \dfrac{f(x)}{g(x)} =$

(4) $\lim_{x\to -3}[x^2 g(x)] =$

(5) $\lim_{x\to -1} \sqrt{2f(x) + 4g(x)} =$

Problem 5. Find the following limits algebraically. If a limit does not exist, state this and use the limit notation to describe any infinite behavior.

(1) $\lim_{x \to 1} \frac{x^2 - 3x + 5}{x - 3}$

(2) $\lim_{x \to 1} \frac{x^2 + 2x - 3}{x - 1}$

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

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

Problem 6. Find $\lim_{x \to 4} \dfrac{x^2 - x - 12}{x^2 - 16}$ algebraically. If the limit does not exist, state this and use the limit notation to describe any infinite behavior.

Problem 7. Find $\lim_{x \to 5} \dfrac{\frac{1}{5} - \frac{1}{x}}{5 - x}$ algebraically. If the limit does not exist, state this and use the limit notation to describe any infinite behavior.

Problem 8. Find $\lim_{x \to 1} \frac{\sqrt{x+3}-2}{x-1}$ algebraically. If the limit does not exist, state this and use the limit notation to describe any infinite behavior.

Problem 9. Find $\lim_{x \to 3} \frac{|x-3|}{6-2x}$ algebraically. If the limit does not exist, state this and use the limit notation to describe any infinite behavior.

Problem 10. Consider the piecewise function $f(x)$ given below, and answer the questions.

$$f(x) = \begin{cases} 10x - 4x^2 & x < -2 \\ \dfrac{x+1}{x^2 - x - 2} & -2 < x \leq 3 \\ \dfrac{x^2 - 8}{2^{3-x}} & x > 3 \end{cases}$$

(1) $f(-2) =$

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

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

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

(5) $\lim_{x \to 0} f(x) =$

(6) $f(3) =$

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

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

(9) $\lim_{x \to 3} f(x) =$

(10) $\lim_{x \to -1} f(x) =$

(11) $\lim_{x \to 2} f(x) =$

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