

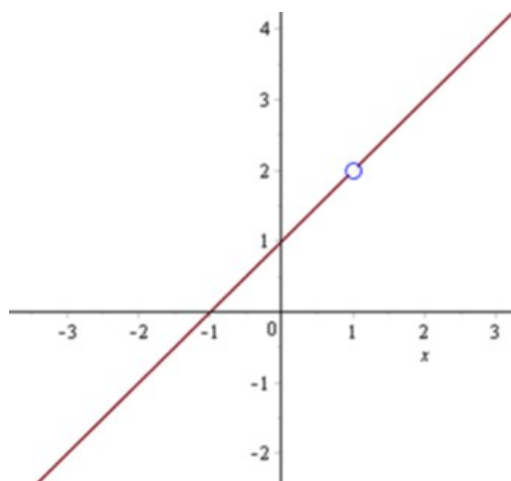
Recitation #3 - 2.2: Definition of Limits

Warm up:

- (a) True or False: To find $\lim_{x \rightarrow 2} f(x)$, it's enough to know $f(2.1)$, $f(2.01)$, $f(2.001)$, etc.
- (b) True or False: If we know $f(2)$, then we know $\lim_{x \rightarrow 2} f(x)$.

Group work:

Problem 1 Given the graph of the function, estimate $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$. Then estimate $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$ by creating a table of values.



Problem 2 Sketch the graph of a function with the given properties. You need not find a formula for the function.

$$f(3) = -2, f(5) = 6, \lim_{x \rightarrow 5^-} f(x) = -1, \lim_{x \rightarrow 5^+} f(x) = 4, \lim_{x \rightarrow 3} f(x) = 7$$
$$\lim_{x \rightarrow -2^-} f(x) = 3, \lim_{x \rightarrow -2^+} f(x) = 0, \lim_{x \rightarrow 1^+} f(x) = 5$$

Problem 3 True/False: Give an explanation or counterexample. Assume a and L are finite numbers.

- (a) If $\lim_{x \rightarrow a} f(x) = L$, then $f(a) = L$.
 - (b) If $\lim_{x \rightarrow a^-} f(x) = L$, then $\lim_{x \rightarrow a^+} f(x) = L$.
 - (c) If $\lim_{x \rightarrow a} f(x) = L$ and $\lim_{x \rightarrow a} g(x) = L$, then $f(a) = g(a)$.
 - (d) $\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$ does not exist if $g(a) = 0$.
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