Recitation #3 - 2.2: Definition of Limits

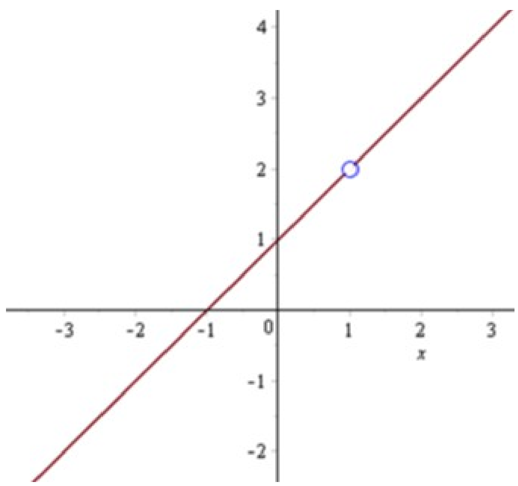
Warm up:

(a) True or False: To find $\lim_{x \to 2} f(x)$, 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 $\lim_{x \to 2} f(x)$.

Group work:

Problem 1 *Given the graph of the function, estimate* $\lim_{x \to 1} \frac{x^2 - 1}{x - 1}$. *Then estimate* $\lim_{x \to 1} \frac{x^2 - 1}{x - 1}$ *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.*

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

$$\lim_{x \to -2^-} f(x) = 3, \lim_{x \to -2^+} f(x) = 0, \lim_{x \to 1^+} f(x) = 5$$

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

(a) *If* $\lim_{x \to a} f(x) = L$, *then* $f(a) = L$.

(b) *If* $\lim_{x \to a^-} f(x) = L$, *then* $\lim_{x \to a^+} f(x) = L$.

(c) *If* $\lim_{x \to a} f(x) = L$ *and* $\lim_{x \to a} g(x) = L$, *then* $f(a) = g(a)$.

(d) $\lim_{x \to a} \frac{f(x)}{g(x)}$ *does not exist if* $g(a) = 0$.