Limit

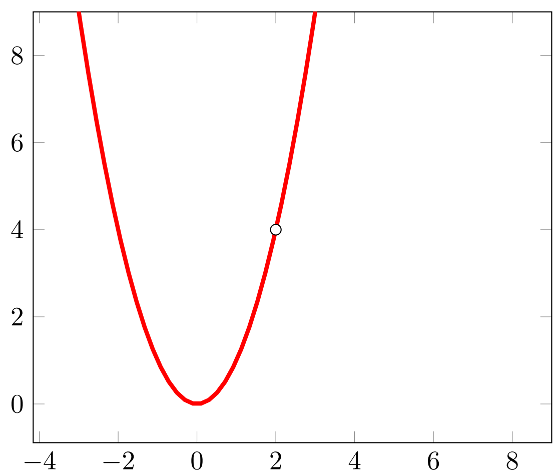
We say the limit of $f(x)$ is L as x approaches a and we write this as

$$\lim_{x \to a} = L$$

provided we can make $f(x)$ as close to L as we want for all x sufficiently close to a from both sides, without actually letting x be a.

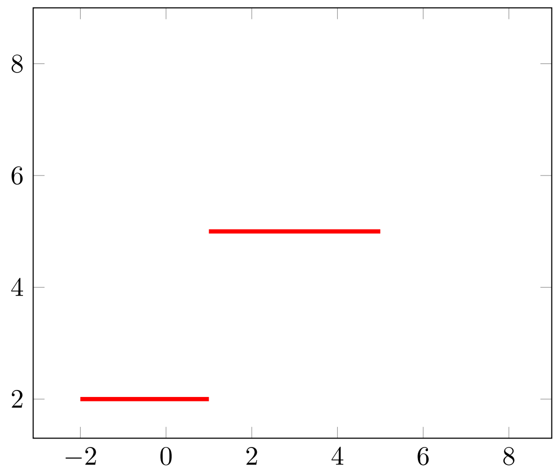
- In simple terms, $f(x)$ gets close to some limit as x gets close to some value.
- Limits describe the behavior of a function as x approaches a particular value.
- Limits do not depend on the actual value of the function at the limit. They describe how the function behaves when it gets close to a limit. A limit L can exist at a even though the function is not defined where $x = a$.
- Here's an example:

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

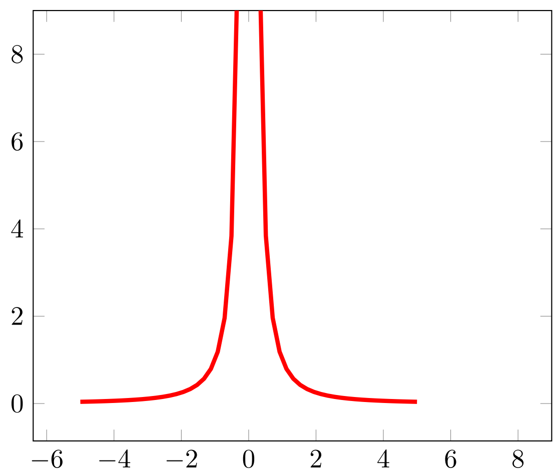


- When a lmit does not approach the same value from both the left and right sides, the limit does not exist.

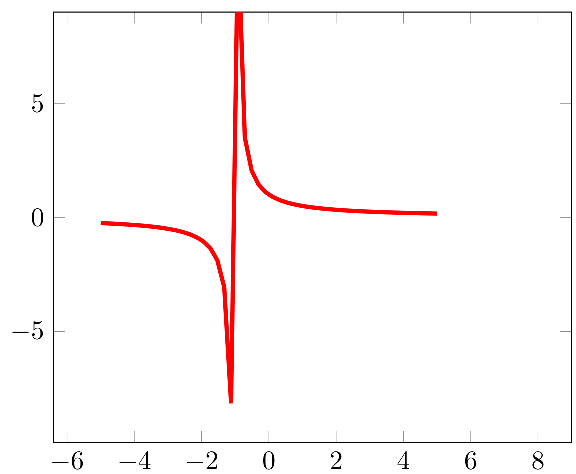
$$\lim_{x \to 1} f(x) = undefined$$



- If a limit is unbounded (approaches infinity) we say that it does not exist.
- $\lim_{x\to 0}\frac{1}{x^2} = \infty$ or "does not exist" or "unbounded"



- $\lim_{x\to 0}\frac{1}{x+1} = undefined$



- Three ways to Evaluate a limit:
  - Algebra (simplify by factoring, conjugates, or trig ident)
  - Table of values
  - Graph