

Introduction to limits

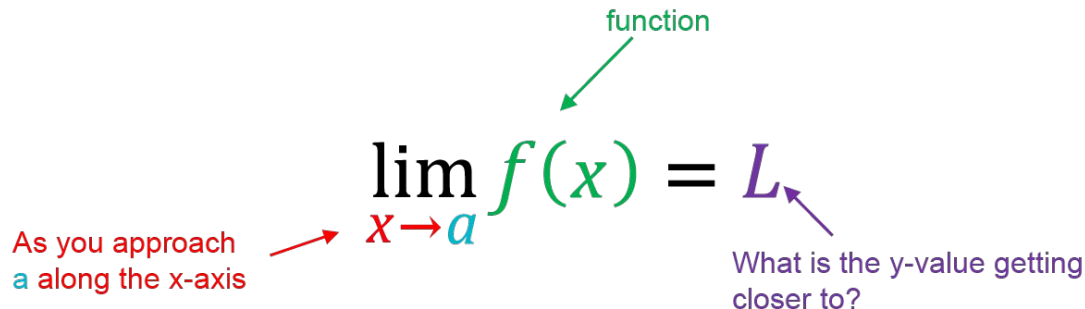
MTH 201 – Module 1B part 1

Today

- What even is a limit and why do we care?
- Review of concepts from Daily Prep 1B
- Finding limits using algebraic simplification
- Finding instantaneous velocities using limits
- Feedback



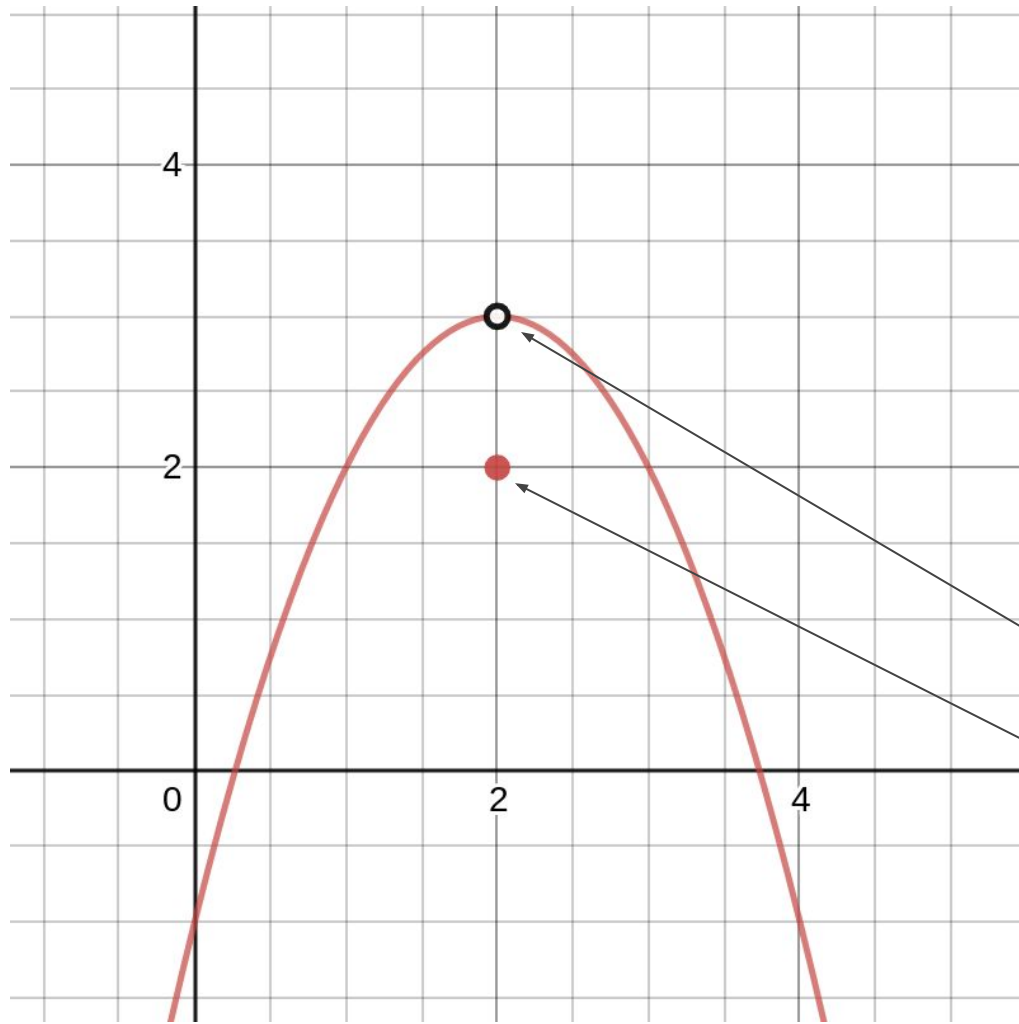
What even is a limit and why do we care?



The diagram illustrates the limit notation $\lim_{x \rightarrow a} f(x) = L$ with several annotations:

- A green arrow points from the word "function" to $f(x)$.
- A red arrow points from the text "As you approach a along the x-axis" to $x \rightarrow a$.
- A purple arrow points from the text "What is the y-value getting closer to?" to L .

- The limit of a function $y = f(x)$ as x approaches a is the value (if any) that $f(x)$ *approaches* as x gets closer and closer to a .
- We care because sometimes functions may not be defined at a point, but have “good behavior” leading up to that point.



As you approach a along the x-axis \rightarrow $\lim_{x \rightarrow a} f(x) = L$ \leftarrow What is the y-value getting closer to?

function

Calcworkshop.com

$$\lim_{x \rightarrow 2} f(x) = 3$$

$$f(2) = 2$$

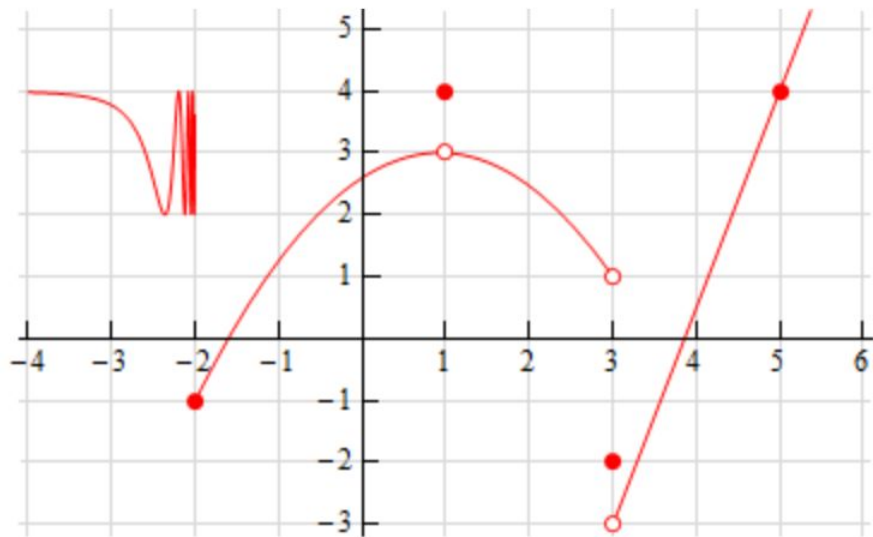


Review

<http://pollev.com/talbert>

The graph of a function $y = f(x)$ is shown. What is

$$\lim_{x \rightarrow 1} f(x)?$$



1

3

4

Infinity

Does not exist

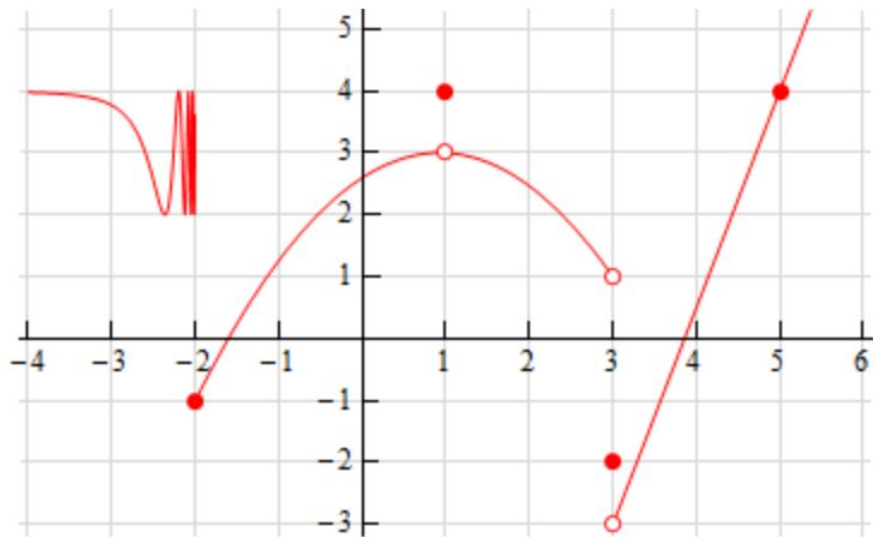


To

0

The graph of a function $y = f(x)$ is shown. What is

$$\lim_{x \rightarrow 5} f(x)?$$



3

4

5

Approximately 5.2

Infinity

Does not exist

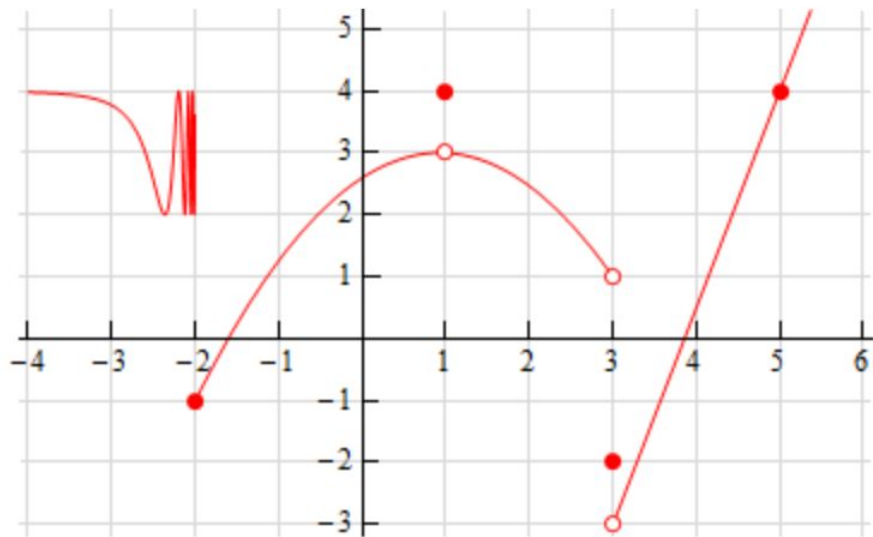


To

0

The graph of a function $y = f(x)$ is shown. What is

$$\lim_{x \rightarrow 3^-} f(x)?$$



-3

-2

1

Approximately 3.6

Infinity

Does not exist

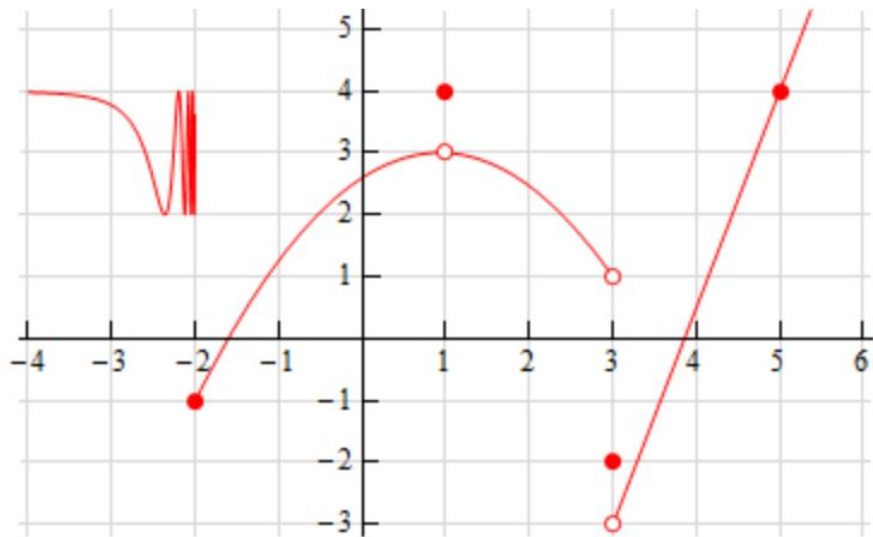


To

0

The graph of a function $y = f(x)$ is shown. What is

$$\lim_{x \rightarrow 3} f(x)?$$



-3

-2

-1

1

Infinity

Does not exist

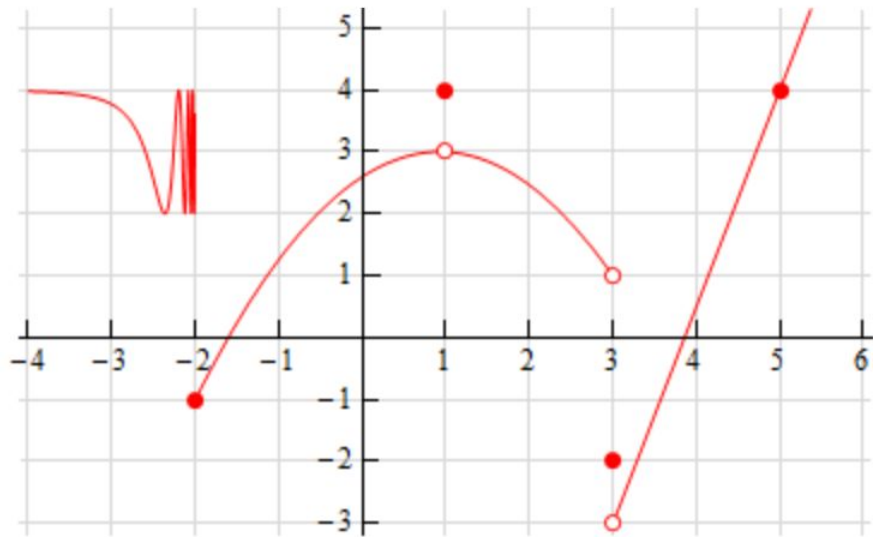


To

0

The graph of a function $y = f(x)$ is shown. What is

$$\lim_{x \rightarrow -\infty} f(x)?$$



4

5

$-\infty$

$+\infty$

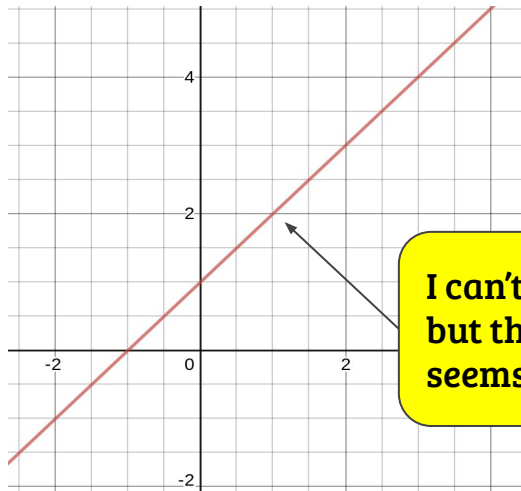
Does not exist





Finding limits using algebra simplification

$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$$



$$\begin{aligned}\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} &= \lim_{x \rightarrow 1} \frac{(x + 1)(x - 1)}{x - 1} \\ &= \lim_{x \rightarrow 1} (x + 1) \\ &= 1 + 1 = 2.\end{aligned}$$

Factor the top

Divide off the common factor

NOW substitute



Activity on Jamboard
Link found in class links post

<http://gvsu.edu/s/1zJ>