

Limits and the Derivative

Math 102 Section 107

Krishanu Sankar

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Limits

Q1. Compute the limit

$$\lim_{x \rightarrow 1} x^3 - 2x^2 - 1$$

- A. 1
- B. -2
- C. 0
- D. -1
- E. Does not exist (DNE)

Limits

Q1. Compute the limit

$$\lim_{x \rightarrow 1} x^3 - 2x^2 - 1$$

- A. 1
- B. -2**
- C. 0
- D. -1
- E. Does not exist (DNE)
 - ▶ Simply plug in $x = 1$.

Limits

Q2. Compute the limit

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

- A. 1
- B. 2
- C. 0
- D. -2
- E. Does not exist (DNE)

Limits

Q2. Compute the limit

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

- A. 1
- B. 2
- C. 0
- D. -2
- E. Does not exist (DNE)
 - ▶ This function “blows up” as $x \rightarrow 2$ (division by zero), so the limit DNE.

Limits

Q3. Compute the limit

$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$

- A. 4
- B. 2
- C. 0
- D. -4
- E. Does not exist (DNE)

Limits

Q3. Compute the limit

$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$

- A. 4
- B. 2
- C. 0
- D. -4
- E. Does not exist (DNE)

Limits

$$\begin{aligned}\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} &= \lim_{x \rightarrow 2} \frac{(x - 2)(x + 2)}{x - 2} \\ &= \lim_{x \rightarrow 2} (x + 2) \\ &= 4\end{aligned}$$

The function is not defined at $x = 2$ but it does have a limit there:

<https://www.desmos.com/calculator/hoofsji5p4>