

3.8 Differentiability

Wednesday, June 12, 2019 7:15 AM

$$f(x) = \begin{cases} x^2 - 3x - 1, & x \leq 2 \rightarrow 2x - 3 \\ -2x + 1, & x > 2 \rightarrow -2 \end{cases}$$

-3 (under the first piece), -3 (under the second piece)

Limits

$$\begin{aligned} \lim_{x \rightarrow 2^-} f(x) &= -3 \\ \lim_{x \rightarrow 2^+} f(x) &= -3 \\ \lim_{x \rightarrow 2} f(x) &= -3 \end{aligned}$$

Continuity

$$\begin{aligned} \lim_{x \rightarrow 2} f(x) &= -3 \\ f(2) &= -3 \end{aligned}$$

Yes $f(x)$ is cont. @ $x = 2$

Differentiability

$$\begin{aligned} f'(x) &= 2x - 3 \\ f'(2) &= 2(2) - 3 = 1 \\ f''(x) &= -2 \\ f''(2) &= -2 \end{aligned}$$

No $f(x)$ is NOT diff. @ $x = 2$

ex

$$f(x) = \begin{cases} x^2 + 10, & x < 4 \rightarrow 2x \\ 8x - 6, & x \geq 4 \rightarrow 8 \end{cases}$$

26 (under the first piece), 8 (under the second piece)

Cont. @ $x = 4$?

Diff. @ $x = 4$?

- Yes
- Yes
- No
- ~~No~~

- Yes
- No
- No
- ~~Yes~~

→

IMPOSSIBLE