Office Hour. Questions Please.

I am open for tutoring appointments on Mondays, Wednesdays and Fridays. When you schedule it, please make sure to include the time you want to meet in the email.

4.3.55.

\[ y = f(x) = \begin{cases} 
  x^2 - 4x & x \in [0,1] \\
  x^2 - 4 & x \in (1,2]
\end{cases} \]

First, the function is continuous, because

\[ \lim_{x \to 1^-} f(x) = 1 - 4 = -3 = f(1) \]
\[ \lim_{x \to 1^+} f(x) = 1 - 4 = -3 \]

We can apply closed interval method.

\[ f'(x) = \begin{cases} 
  2x - 4 & x \in (0,1) \\
  DNE & x = 1 \\
  2x & x \in (1,2)
\end{cases} \]

where \( f'(1) \) does not exist because \( \lim_{x \to 1^-} f'(x) = 2 - 4 = -2 \)

\[ \lim_{x \to 1^+} f'(x) = 2 \neq -2. \]

\( f'(x) = 0 \Rightarrow 2x - 4 = 0, x \in (0,1), \text{ or } 2x = 0, x \in (1,2) \)

\( \Rightarrow x = 2, x \in (0,1), \text{ or } x = 0, x \in (1,2) \)

None of these numbers are critical.

Conclusion: 1 is the only critical number.

\( f(0) = 0, f(1) = 1 - 4 = -3, f(2) = 2^2 - 4 = 0 \)

Conclusion: \( f(1) = -3 \) is the absolute minimum.

\( f(2) = f(0) = 0 \) is the absolute maximum.