Instructions
Read today's Notes and Learning Goals
1. Question Details

Consider the function \( f(x) = \frac{e^{3x} - 1}{2x} \).

What happens if you try to plug in \( x = 0 \)?

- \( \frac{0}{0} \)
- non-zero
- \( \frac{\text{non-zero}}{0} \)
- \( f(0) \) is defined

Does \( \lim_{x \to 0} \frac{e^{3x} - 1}{2x} \) meet the requirements for L'Hopital's rule?

- yes
- no

Compute \( \lim_{x \to 0} \frac{e^{3x} - 1}{2x} \). If an answer does not exist, enter DNE.

\[ \frac{e^{3x} - 1}{2x} \]

What best describes the graph of \( f \) at \( x = 0 \)?

- asymptote
- hole
- continuous
Consider the function \( f(x) = \frac{\ln(x)}{4x - 4} \).

What happens if you try to plug in \( x = 1 \)?

- \( \frac{0}{0} \)
- non-zero
- \( \frac{\ln(1)}{0} \)
- \( f(1) \) is defined

Does \( \lim_{x \to 1} \frac{\ln(x)}{4x - 4} \) meet the requirements for L'Hopital's rule?

- no
- yes

Compute \( \lim_{x \to 1} \frac{\ln(x)}{4x - 4} \). If an answer does not exist, enter DNE.

What best describes the graph of \( f \) at \( x = 1 \)?

- asymptote
- hole
- continuous
Consider the function \( f(x) = \frac{x^2 - 4x - 5}{x^2 + x} \).

What happens if you try to plug in \( x = 0 \)?

- \( f(0) \) is defined
- \( \frac{0}{0} \)
- \( \frac{\text{non-zero}}{0} \)

Does \( \lim_{x \to 0} \frac{x^2 - 4x - 5}{x^2 + x} \) meet the requirements for L'Hopital's rule?

- no
- yes

Compute \( \lim_{x \to 0} \frac{x^2 - 4x - 5}{x^2 + x} \). If an answer does not exist, enter DNE.

What best describes the graph of \( f \) at \( x = 0 \)?

- hole
- continuous
- asymptote
Consider the function \( f(x) = \frac{x^2 - 4x - 5}{x^2 + x} \).

What happens if you try to plug in \( x = -1 \)?

- \( f(-1) \) is defined
- \( 0 \)
- \( \frac{\text{non-zero}}{0} \)

Does \( \lim_{x \to -1} \frac{x^2 - 4x - 5}{x^2 + x} \) meet the requirements for L'Hopital's rule?

- no
- yes

Compute \( \lim_{x \to -1} \frac{x^2 - 4x - 5}{x^2 + x} \). If an answer does not exist, enter DNE.

What best describes the graph of \( f \) at \( x = -1 \)?

- hole
- asymptote
- continuous
5. Question Details

Consider the function \( f(x) = \frac{x^2 - 4x - 5}{x^2 + x} \).

What happens if you try to plug in \( x = 1 \)?

- \( \frac{0}{0} \)
- non-zero
- \( 0 \)
- \( f(1) \) is defined

Does \( \lim_{x \to 1} \frac{x^2 - 4x - 5}{x^2 + x} \) meet the requirements for L'Hopital's rule?

- yes
- no

Compute \( \lim_{x \to 1} \frac{x^2 - 4x - 5}{x^2 + x} \). If an answer does not exist, enter DNE.


What best describes the graph of \( f \) at \( x = 1 \)?

- hole
- asymptote
- continuous
Consider the function \( f(x) = \frac{x^2 - 1}{x^2 + 1} \).

What happens if you try to plug in \( x = 1 \)?

- \( \frac{0}{0} \)
- \( f(1) \) is defined
- \( \frac{\text{non-zero}}{0} \)

Does \( \lim_{x \to 1} \frac{x^2 - 1}{x^2 + 1} \) meet the requirements for L'Hopital's rule?

- Yes
- No

Compute \( \lim_{x \to 1} \frac{x^2 - 1}{x^2 + 1} \). If an answer does not exist, enter DNE.

What best describes the graph of \( f \) at \( x = 1 \)?

- Asymptote
- Continuous
- Hole
Consider the function \( f(x) = \frac{x^2 - x - 12}{x^2 + 6x + 9} \).

What happens if you try to plug in \( x = -3 \)?

- \( \frac{0}{0} \)
- non-zero
- \( f(-3) \) is defined

Does \( \lim_{x \to -3} \frac{x^2 - x - 12}{x^2 + 6x + 9} \) meet the requirements for L'Hopital's rule?

- yes
- no

Compute \( \lim_{x \to -3} \frac{x^2 - x - 12}{x^2 + 6x + 9} \). If an answer does not exist, enter DNE.

What best describes the graph of \( f \) at \( x = -3 \)?

- continuous
- asymptote
- hole
8. **Question Details**

Evaluate the limit. (If an answer does not exist, enter DNE.)

\[
\lim_{x \to -10} \frac{x^2 - 100}{60 - 4x - x^2}
\]

9. **Question Details**

Evaluate the limit. (If an answer does not exist, enter DNE.)

\[
\lim_{x \to 4} \frac{x^3 - 64}{x^2 + 16}
\]

10. **Question Details**

Evaluate the limit. (If an answer does not exist, enter DNE.)

\[
\lim_{x \to 0} \frac{\sin 7x}{x^2 + 5x}
\]
11. Question Details
Evaluate the limit. (If an answer does not exist, enter DNE.)
\[
\lim_{x \to 0} \frac{\tan 3x}{4x}
\]

12. Question Details
Evaluate the limit. (If an answer does not exist, enter DNE.)
\[
\lim_{x \to \frac{3\pi}{2}} \frac{\cos(x + \pi)}{\sin(x - \frac{\pi}{2})}
\]

13. Question Details
Evaluate the limit. (If an answer does not exist, enter DNE.)
\[
\lim_{x \to 0} \frac{7x^2}{\cos x - 1}
\]
14. **Question Details**

Evaluate the limit. (If an answer does not exist, enter DNE.)

\[ \lim_{{x \to 0^+}} \frac{e^{3x} + 4x - 1}{2\ln(x + 1)} \]

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15. **Question Details**

Evaluate the limit. (If an answer does not exist, enter DNE.)

\[ \lim_{{x \to 0}} \frac{e^{2x} - 1 - 3x}{(3x)^2} \]

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16. **Question Details**

Evaluate the limit. (If an answer does not exist, enter DNE.)

\[ \lim_{{x \to 1}} \frac{9x(\ln x - 1) + 9}{(x - 1)\ln x} \]
Consider the function \( f(x) = \frac{2x^2 - 4x - 5}{5x^2 + x} \).

What happens if \( x \) goes to infinity?

- \( 0 \quad 0 \)
- \( \frac{\infty}{\infty} \)
- None of the above

Does \( \lim_{x \to \infty} \frac{2x^2 - 4x - 5}{5x^2 + x} \) meet the requirements for L'Hopital's rule?

- no
- yes

Compute \( \lim_{x \to \infty} \frac{2x^2 - 4x - 5}{5x^2 + x} \). If an answer does not exist, enter DNE.

\[
\lim_{x \to \infty} \frac{12x^2 + 4x}{9 - 4x^2}
\]
Consider the function \( f(x) = x \ln(x) \). You could rewrite this by changing \( x \) into a denominator as shown below.

\[
f(x) = \frac{\ln(x)}{x^{-1}}
\]

Using the **new version** of \( f \), what happens if you try to plug in \( x = 0 \)?

- \( \frac{0}{0} \)
- \( \frac{\infty}{\infty} \)
- None of the above

Does \( \lim_{x \to 0^+} \frac{\ln(x)}{x^{-1}} \) meet the requirements for L'Hopital's rule?

- no
- yes

(Note: \( 0^+ \) is a technical domain restriction. It has no effect on this problem.)

Compute \( \lim_{x \to 0^+} \frac{\ln(x)}{x^{-1}} \). If an answer does not exist, enter DNE.
Evaluate the limit. If an answer does not exist, enter DNE. If the answer is a number, enter an exact value. No decimals.

\[
\lim_{{x \to 1}} \ln(x) \tan\left( \frac{\pi x}{2} \right)
\]