Limits Worksheet Algebraically And Graphically Precalcus Answer Key PDF

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Part 1: Building a Foundation

What does the notation \(\lim_{x \to a} f(x) = L\) signify?

undefined. A) \(f(x)\) is undefined at \(x = a\)

undefined. B) As \(x\) approaches \(a\), \(f(x)\) approaches \(L\) ✓

undefined. C) \(f(x)\) is always equal to \(L\)

undefined. D) \(f(x)\) is discontinuous at \(x = a\)

The notation signifies that as x approaches a, the function f(x) approaches L.

Which of the following are methods to calculate limits algebraically?

undefined. A) Direct substitution ✓

undefined. B) Graphical analysis

undefined. C) Factoring ✓

undefined. D) Rationalization ✓

Methods to calculate limits include direct substitution, factoring, and rationalization.

Explain what it means for a function to be continuous at a point \(a\).

A function is continuous at a point a if the limit as x approaches a equals the function value at a.

List two types of discontinuities that can affect the existence of a limit.

1. Type 1

Removable discontinuity

2. Type 2

Jump discontinuity

Common types of discontinuities include removable discontinuities and jump discontinuities.

If \(\lim_{x \to a^-} f(x) \neq \lim_{x \to a^+} f(x)\), what can be concluded about \(\lim_{x \to a} f(x)\)?

undefined. A) The limit exists and equals \(f(a)\)

undefined. B) The limit does not exist ✓

undefined. C) The limit is infinite

undefined. D) The function is continuous at \(x = a\)

If the left-hand limit does not equal the right-hand limit, then the limit does not exist.

Part 2: Understanding and Interpretation

Which statement best describes a horizontal asymptote?

undefined. A) A line that the graph of a function approaches as \(x\) approaches a finite value

undefined. B) A line that the graph of a function approaches as \(x\) approaches infinity ✓

undefined. C) A point where the function is undefined

undefined. D) A line that intersects the graph at multiple points

A horizontal asymptote is a line that the graph of a function approaches as x approaches infinity.

Which of the following statements are true about limits at infinity?

undefined. A) They describe the end behavior of a function ✓

undefined. B) They can determine vertical asymptotes

undefined. C) They are always finite

undefined. D) They can be used to find horizontal asymptotes ✓

Limits at infinity describe the end behavior of a function and can help find horizontal asymptotes.

Describe how you would use a graph to determine if a function is continuous at a point.

To determine continuity from a graph, check if the graph is unbroken and if the limit equals the function value at that point.

Part 3: Application and Analysis

Given $f(x) = \frac{x^2 - 1}{x - 1}$, what is $\lim_{x \to 1} f(x)$?

undefined. A) 0

undefined. B) 1 ✓

undefined. C) 2

undefined. D) Does not exist

The limit can be found by simplifying the function and then substituting x = 1.

Which of the following steps are necessary to find $\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$?

undefined. A) Direct substitution

undefined. B) Factoring the numerator ✓

undefined. C) Simplifying the expression ✓

undefined. D) Rationalizing the denominator

Necessary steps include factoring the numerator and simplifying the expression.

Explain how you would apply L'Hôpital's Rule to find the limit of $\frac{\sin x}{x}$ as x approaches 0.

L'Hôpital's Rule can be applied when the limit results in an indeterminate form, such as $\frac{0}{0}$.

Which of the following functions has a removable discontinuity at $x = 2$?

undefined. A) $f(x) = \frac{x^2 - 4}{x - 2}$ ✓

undefined. B) $f(x) = \frac{x^2 + 4}{x - 2}$

undefined. C) $f(x) = \frac{x^2 - 4}{x^2 - 4}$

undefined. D) $f(x) = \frac{x + 2}{x - 2}$

A removable discontinuity occurs when a function can be redefined to make it continuous.

When analyzing the function $f(x) = \frac{1}{x}$, which of the following are true?

undefined. A) The function has a vertical asymptote at $x = 0$ ✓

undefined. B) The function is continuous for all $x \neq 0$ ✓

undefined. C) The limit as \(x\) approaches 0 from the right is \(\infty\) ✓

undefined. D) The limit as \(x\) approaches 0 from the left is \(-\infty\) ✓

The function has a vertical asymptote at x = 0 and is continuous for all x except at that point.

Part 4: Evaluation and Creation

If a function \(f(x)\) has limits \(\lim_{x \to a^-} f(x) = 3\) and \(\lim_{x \to a^+} f(x) = 5\), what can be concluded about \(\lim_{x \to a} f(x)\)?

undefined. A) The limit is 4

undefined. B) The limit does not exist ✓

undefined. C) The limit is 3

undefined. D) The limit is 5

If the left-hand limit does not equal the right-hand limit, then the limit does not exist.

Which of the following are potential strategies to resolve an indeterminate form of type \(\frac{0}{0}\)?

undefined. A) Direct substitution

undefined. B) L'Hôpital's Rule ✓

undefined. C) Factoring ✓

undefined. D) Adding a constant

Strategies include using L'Hôpital's Rule, factoring, and simplifying the expression.

Create a real-world scenario where understanding limits is crucial, and explain how limits help solve the problem.

Understanding limits can help in various fields such as physics, engineering, and economics.