Limits Worksheet Algebraically And Graphically Precalculus Answer Key PDF

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Part 1: Building a Foundation

What is the notation used to represent the limit of a function \(f(x)\) as \(x\) approaches a value \(a\)?

undefined. A) \(f(a)\)

undefined. B) \(\lim_{x \to a} f(x)\) ✓

undefined. C) \(f'(a)\)

undefined. D) \(\int f(x) dx\)

The correct notation for the limit of a function as x approaches a value is \(\lim_{x \to a} f(x)\).

Which of the following are methods used to evaluate limits algebraically? (Select all that apply)

undefined. A) Substitution ✓

undefined. B) Factoring ✓

undefined. C) GraphING

undefined. D) Rationalizing ✓

Methods such as substitution, factoring, and rationalizing are commonly used to evaluate limits.

Explain what a limit represents in the context of a function's behavior.

A limit represents the value that a function approaches as the input approaches a certain point.

List two types of discontinuities that can be identified using limits.

1. Type 1

Removable Discontinuity

2. Type 2

Jump Discontinuity

Common types of discontinuities include removable discontinuities and jump discontinuities.

What is the limit of a constant function \(f(x) = c\) as \(x\) approaches any value \(a\)?

undefined. A) 0
undefined. B) \(c\) ✓
undefined. C) \(a\)
undefined. D) Undefined

The limit of a constant function as x approaches any value is the constant itself.

Part 2: Comprehension and Application

If \(\lim_{x \to 3} f(x) = 7\), what does this imply about the function \(f(x)\) as \(x\) approaches 3?

undefined. A) \(f(3) = 7\)
undefined. B) \(f(x)\) becomes undefined at \(x = 3\)
undefined. C) \(f(x)\) approaches 7 as \(x\) approaches 3 ✓
undefined. D) \(f(x)\) has a discontinuity at \(x = 3\)

This implies that as x approaches 3, the function f(x) approaches the value 7.

Which statements are true about one-sided limits? (Select all that apply)

undefined. A) They are used to determine the behavior of a function from one direction. ✓
undefined. B) They are always equal to the two-sided limit.
undefined. C) They can help identify jump discontinuities. ✓
undefined. D) They are only applicable to polynomial functions.

One-sided limits help analyze function behavior from a specific direction and can identify discontinuities.

Describe how the Squeeze Theorem can be used to find the limit of a function.

The Squeeze Theorem states that if a function is squeezed between two other functions that have the same limit, then it also has that limit.

Given \(f(x) = \frac{x^2 - 1}{x - 1}\), find \(\lim_{x \to 1} f(x)\) using algebraic techniques.

undefined. A) 0

undefined. B) 1

undefined. C) 2 ✓

undefined. D) Does not exist

After simplifying, the limit can be evaluated to find the value as x approaches 1.

Part 3: Analysis, Evaluation, and Creation

Analyze the function \(g(x) = \frac{x^2 - 4}{x - 2}\). What type of discontinuity does it have at \(x = 2\)?

undefined. A) Jump Discontinuity

undefined. B) Infinite Discontinuity

undefined. C) Removable Discontinuity ✓

undefined. D) No Discontinuity

The function has a removable discontinuity at x = 2 because it can be simplified.

Which of the following are true when analyzing the limit \(\lim_{x \to 0} \frac{\sin x}{x}\)? (Select all that apply)

undefined. A) The limit is evaluated using the Squeeze Theorem. ✓

undefined. B) The limit is 1. ✓

undefined. C) The function is continuous at \(x = 0\). ✓

undefined. D) The limit does not exist.

The limit evaluates to 1 and can be shown using the Squeeze Theorem.

Analyze the behavior of the function \(h(x) = \frac{1}{x}\) as \(x\) approaches 0 from the left and right. What conclusions can you draw about its limits?

As x approaches 0 from the left, h(x) approaches negative infinity, and from the right, it approaches positive infinity.

Evaluate the following statement: "If $\lim_{x \to a} f(x) = L$, then $f(x)$ must be continuous at $x = a$."

undefined. A) True

undefined. B) False ✓

undefined. C) It depends on the function.

undefined. D) This statement is always true.

This statement is false; limits can exist even if the function is not continuous at that point.

Consider the real-world scenario where a car's speed is modeled by the function $s(t) = \frac{100 t}{ t + 10}$. Evaluate the car's speed as time t approaches infinity. (Select all that apply)

undefined. A) The speed approaches 10 units.

undefined. B) The speed approaches 100 units. ✓

undefined. C) The speed becomes constant. ✓

undefined. D) The speed increases indefinitely.

As t approaches infinity, the speed approaches 100 units, indicating a constant speed.

Create a function that has a removable discontinuity at $x = 3$ and explain how you would modify it to make it continuous.

An example function could be $f(x) = \frac{(x-3)(x+1)}{x-3}$, which has a removable discontinuity at x = 3. To make it continuous, redefine f(3) = 4.

Propose two different functions that have the same limit as x approaches 2, but differ in their continuity at that point.

1. Function 1

f(x) = \frac{x^2 - 4}{x - 2}

2. Function 2

g(x) = x^2

For example, $f(x) = \frac{x^2 - 4}{x - 2}$ has a removable discontinuity at x = 2, while $g(x) = x^2$ is continuous at x = 2. Both have the same limit of 4 as x approaches 2.