

Unit 12 Test

Limits, Continuity & the Derivative as a Rate of Change

Name: _____ Date: _____ Score: ____ / 10

INSTRUCTIONS

For multiple-choice questions, circle the letter of the correct answer. For short-answer and problem-solving questions, show your complete work in the space provided. No calculator unless your teacher says otherwise.

1 Evaluate: $\lim_{x \rightarrow 2}$ of $(x^2 - 4)/(x - 2)$

Multiple Choice

A 4**B** 0**C** 2**D** Undefined**2 Evaluate: $\lim_{x \rightarrow 3}$ of $(x^2 - 9)/(x - 3)$**

Multiple Choice

A 6**B** 0**C** 3**D** 9**3 Short Answer — Evaluate: $\lim_{x \rightarrow 1}$ of $(x^2 - 1)/(x - 1)$**

Short Answer

4 At which value of x is $f(x) = 1/(x - 3)$ discontinuous?

Multiple Choice

A $x = 3$ **B** $x = 0$ **C** $x = -3$ **D** It is continuous everywhere**5 Which statement about $f(x) = |x|$ at $x = 0$ is true?**

Multiple Choice

A It is continuous but not differentiable**B** It is differentiable but not continuous**C** It is neither continuous nor differentiable**D** It is both continuous and differentiable**6 Short Answer — Find the average rate of change of $f(x) = x^2$ on the interval $[2, 5]$.**

Short Answer

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Using the limit definition of the derivative, find $f'(x)$ for $f(x) = x^2$.

Multiple Choice

A $f'(x) = 2x$

B $f'(x) = x^2$

C $f'(x) = 2$

D $f'(x) = x$

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Find the instantaneous rate of change of $f(x) = x^2$ at $x = 3$.

Multiple Choice

A 6

B 9

C 3

D 12

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Problem Solving — Evaluate $\lim_{x \rightarrow \infty} (3x^2 + 2x)/(x^2 - 5)$, and explain the reasoning behind your method.

Problem Solving

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Problem Solving — Use the limit definition of the derivative to find $f'(x)$ for $f(x) = x^2 + 3x$. Show all steps.

Problem Solving