

AP Calculus AB · Limits and Continuity · Test

Common Core AP Calculus AB Unit 1 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This ap calculus limits test checks limits and continuity in 45 minutes, with 9 questions for a total of 20 points.

This 45-minute test has 9 questions worth 20 points. Calculators are not needed. Show your work for every question, give exact values, and write DNE when a limit does not exist.

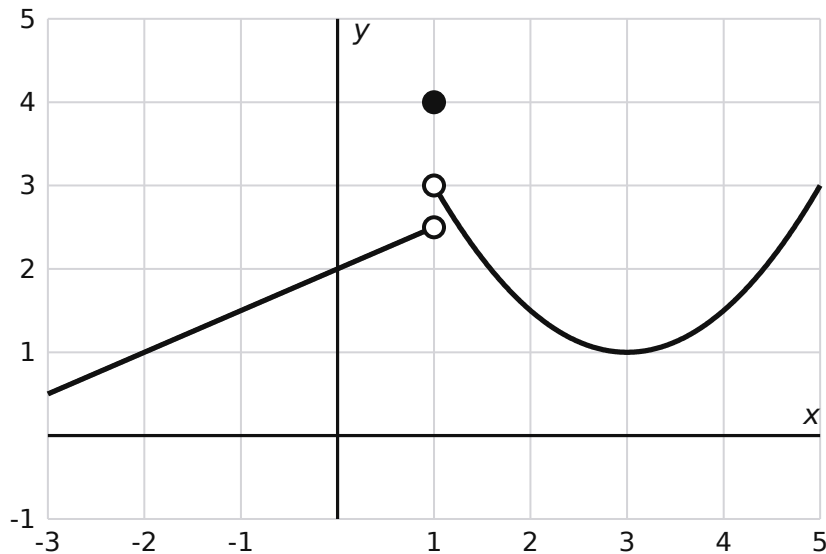
Test information

- **Grade:** AP Calculus AB
- **Chapter:** Limits and Continuity
- **Common Core:** AP Calculus AB Unit 1
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 2 pts; Question 4: 3 pts; Question 5: 2 pts; Question 6: 3 pts; Question 7: 2 pts; Question 8: 2 pts; Question 9: 2 pts)

AP Calculus Limits Test: questions 1-5

Question 1: Limits from a graph (2 points)

The graph of g is shown.



Graph of g .

- Find $\lim_{x \rightarrow 1^-} g(x)$, $\lim_{x \rightarrow 1^+} g(x)$, and $\lim_{x \rightarrow 1} g(x)$ (write DNE if it does not exist). (1 point)
- Find $g(1)$ and $\lim_{x \rightarrow 3} g(x)$. (1 point)

Question 2: Algebraic limits (2 points)

Evaluate each limit.

- $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4}$ (1 point)
- $\lim_{x \rightarrow 0} \frac{\sqrt{x+9} - 3}{x}$ (1 point)

Question 3: Infinity and asymptotes (2 points)

- Evaluate $\lim_{x \rightarrow \infty} \frac{6x^3 - 2x}{2x^3 + 5}$. (1 point)
- Let $f(x) = \frac{x+1}{x-2}$. Find $\lim_{x \rightarrow 2^+} f(x)$ and $\lim_{x \rightarrow 2^-} f(x)$. (1 point)

Question 4: Continuity of a defined function (3 points)

Let $f(x) = \frac{x^2 - 9}{x - 3}$ for $x \neq 3$ and $f(3) = k$.

- Find $\lim_{x \rightarrow 3} f(x)$. (1 point)
- Find the value of k that makes f continuous at $x = 3$. (1 point)
- If $k = 2$, classify the discontinuity at $x = 3$. (1 point)

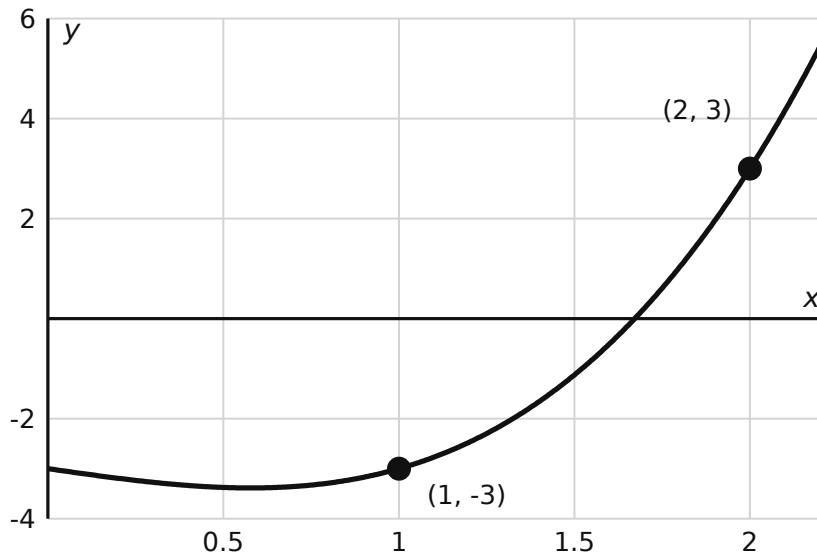
Question 5: Squeeze Theorem (2 points)

- The function g satisfies $4 - (x-1)^2 \leq g(x) \leq 4 + (x-1)^2$ for all x . Find $\lim_{x \rightarrow 1} g(x)$ and justify. (1 point)
- Evaluate $\lim_{x \rightarrow 0} x^2 \sin \frac{5}{x}$ and justify. (1 point)

AP Calculus Limits Test: questions 6-9

Question 6: Intermediate Value Theorem (3 points)

Let $f(x) = x^3 - x - 3$. The graph is shown.

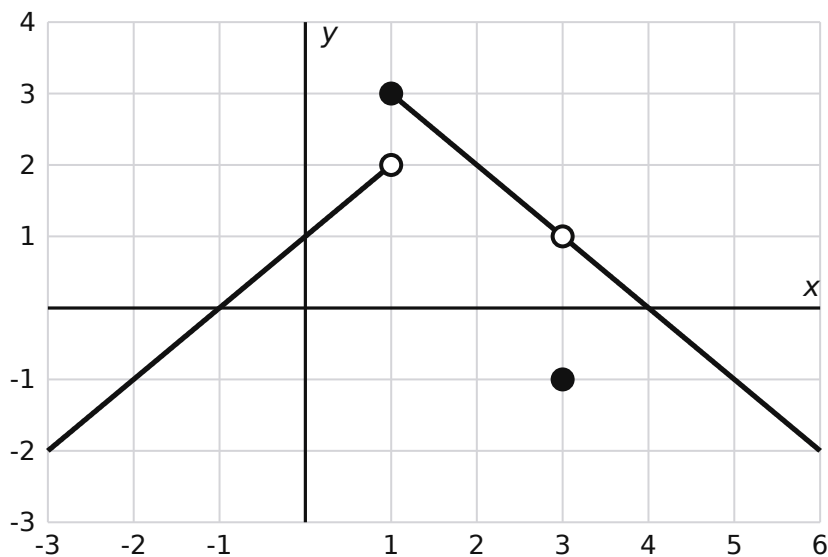


Graph of f .

- Use the Intermediate Value Theorem to show that $f(x) = 0$ has a solution in $(1, 2)$. (2 points)
- Use $f(1.5)$ to narrow the interval that contains a solution. (1 point)

Question 7: Types of discontinuity (2 points)

The graph of q is shown.



Graph of q .

- a. Find every x -value where g is not continuous. (1 point)
- b. Classify each discontinuity from part (a) and give its reason. (1 point)

Question 8: Piecewise continuity (2 points)

Let $f(x) = kx + 2$ when $x \leq 1$ and $f(x) = 3x^2 - k$ when $x > 1$. Find the value of k that makes f continuous at $x = 1$.

Question 9: Long-run concentration (2 points)

The concentration of a medicine in mg/L is $C(t) = \frac{50t}{t+4}$, where t is hours after a dose.

- a. Find $\lim_{t \rightarrow \infty} C(t)$ and explain what it means. (1 point)
- b. At what time does the concentration reach 40 mg/L? (1 point)

How to use this ap calculus limits test

Take this ap calculus limits test without notes, then grade it with the test answer key out of 20 points.

