

AP Calculus AB · Limits and Continuity · Test Answer Key

Common Core AP Calculus AB Unit 1 · mathovore.fr

This ap calculus limits test answer key gives the full solution and the scoring guide for each of the 9 test questions on limits and continuity.

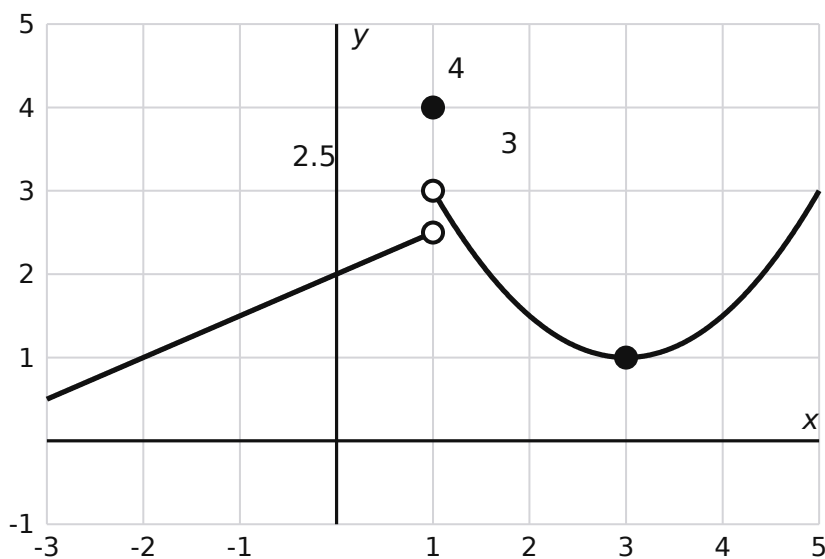
Award points as shown in each scoring note. Accept equivalent forms and correct work shown in a different order. Award half credit only where the note allows it.

AP Calculus ABCommon Core: AP Calculus AB Unit 1

AP Calculus Limits Test Answer Key: questions 1-5

Question 1: Limits from a graph (2 points)

- The left limit is **2.5**, the right limit is **3**, and the limit is **DNE** because they differ.
- The filled point gives $g(1) = 4$. Both sides approach the low point of the parabola, so the limit at 3 is **1**.



Values read from the graph.

Scoring: part (a) 1 point (both one-sided limits and the conclusion, deduct nothing for DNE written as "does not exist"); part (b) 1 point (both values).

Question 2: Algebraic limits (2 points)

- a. $\frac{(x-4)(x+4)}{x-4} = x+4$, so the limit is **8**.
- b. Multiply by $\sqrt{x+9}+3$: the numerator becomes x , leaving $\frac{1}{\sqrt{x+9}+3}$, so the limit is $\frac{1}{6}$.

Scoring: for each part, 1 point for the correct value shown with a valid algebraic step (factoring or conjugate). Correct value with no work earns 0.5.

Question 3: Infinity and asymptotes (2 points)

- a. Equal degrees: the ratio of leading coefficients is **3**.
- b. Near $x=2$ the numerator is about 3. The denominator is a small positive number from the right and a small negative number from the left, so the limits are ∞ and $-\infty$.

Scoring: part (a) 1 point for 3. Part (b) 1 point for both limits with correct signs; 0.5 if only one sign is correct.

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

- a. $\frac{(x-3)(x+3)}{x-3} = x+3$, so the limit is **6**.
- b. Continuity needs $f(3) = \lim_{x \rightarrow 3} f(x)$, so **k=6**.
- c. The limit exists (6) but $f(3) = 2 \neq 6$, so the discontinuity is **removable**.

Scoring: 1 point per part. Part (c) requires both the word removable and the reason that the limit exists but differs from $f(3)$.

Question 5: Squeeze Theorem (2 points)

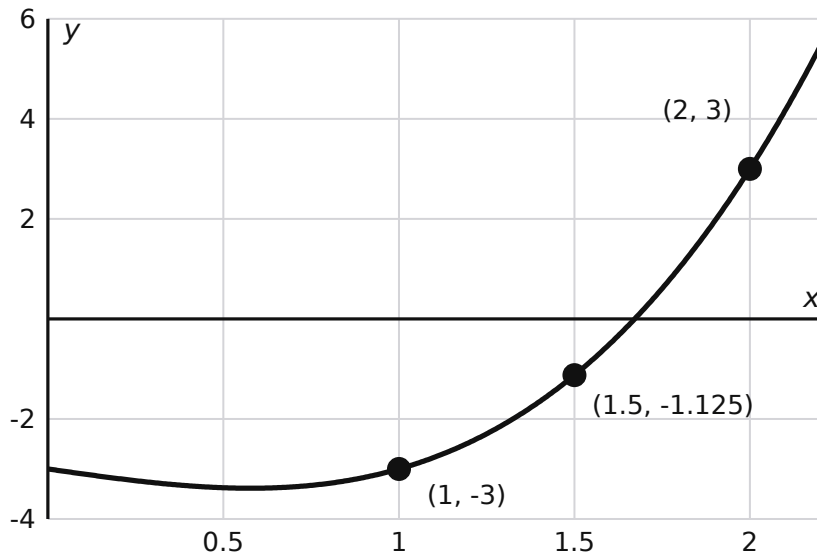
- a. Both bounds tend to 4 as $x \rightarrow 1$, so by the Squeeze Theorem the limit is **4**.
- b. Since $-1 \leq \sin \frac{5}{x} \leq 1$, we get $-x^2 \leq x^2 \sin \frac{5}{x} \leq x^2$. Both bounds tend to 0, so the limit is **0**.

Scoring: for each part, 0.5 points for the correct bounds and 0.5 points for the value with a conclusion that names the Squeeze Theorem.

AP Calculus Limits Test Answer Key: questions 6-9

Question 6: Intermediate Value Theorem (3 points)

- a. f is a polynomial, so it is continuous on $[1,2]$. $f(1) = -3$ and $f(2) = 3$. Since 0 is between -3 and 3 , there is a c in $(1,2)$ with $f(c) = 0$.
- b. $f(1.5) = 3.375 - 1.5 - 3 = -1.125 < 0$ and $f(2) = 3 > 0$, so a solution lies in $(1.5, 2)$.

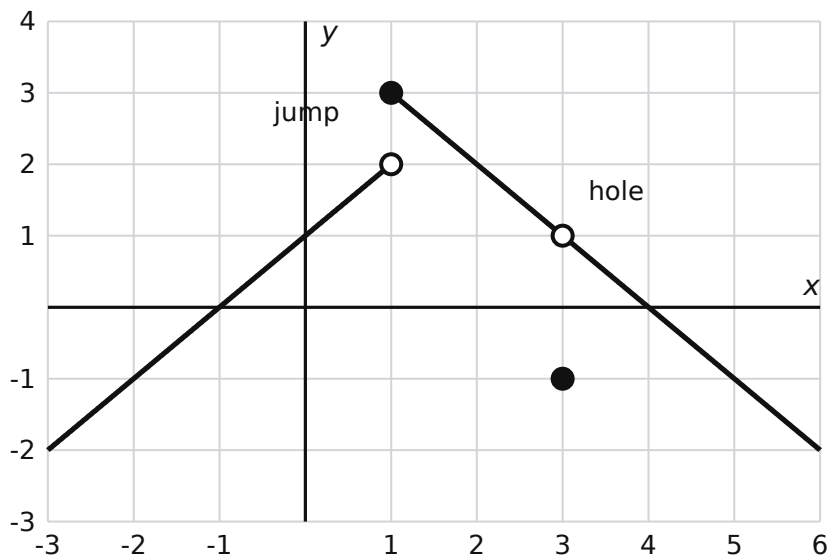


The sign change between 1.5 and 2.

Scoring: part (a) 1 point for noting continuity and 1 point for the endpoint values with the conclusion. Part (b) 1 point for $f(1.5) = -1.125$ and the interval.

Question 7: Types of discontinuity (2 points)

- $x=1$ and $x=3$
- At $x=1$ the one-sided limits are 2 and 3: a **jump**. At $x=3$ the limit is 1 but $g(3)=-1$: **removable**.



The two discontinuities labeled.

Scoring: part (a) 1 point for both x -values (0.5 if one is missing). Part (b) 0.5 point for each correct classification with its reason.

Question 8: Piecewise continuity (2 points)

Left: $f(1) = k + 2$. Right limit: $3 - k$. Set $k + 2 = 3 - k$, so $k = \frac{1}{2}$. Check: both sides equal 2.5.

Scoring: 1 point for computing both one-sided values correctly; 1 point for solving for k .

Question 9: Long-run concentration (2 points)

- a. Equal degrees: the limit is **50**. The concentration approaches 50 mg/L in the long run.
- b. $50t = 40(t + 4)$, so $10t = 160$ and $t = 16$ **hours**.

Scoring: part (a) 1 point for 50 with its meaning in context. Part (b) 1 point for $t = 16$ hours with units.

Scoring summary

Total
20 points: add the points of every question of this ap calculus limits test answer key.

How to use this ap calculus limits test answer key

Use this ap calculus limits test answer key to score the test fairly and to see which skills need more practice.

