

AP Calculus AB - Introducing Limits - Test Answer Key

Common Core AP CALC AB 1.1, AP CALC AB 1.2, AP CALC AB 1.3, AP CALC AB 1.4 · maths-pdf.fr/en/

Use this answer key to score the limits test out of 20 points. Each solution shows the work and a scoring guide that says how the points are awarded. Give partial credit for a correct setup, a correct derivative or integral, and a correct final statement with units where they apply.

AP Calculus AB · Common Core State Standards: **AP CALC AB 1.1, AP CALC AB 1.2, AP CALC AB 1.3, AP CALC AB 1.4**

Question 1 - Estimating from a table [2 pts]

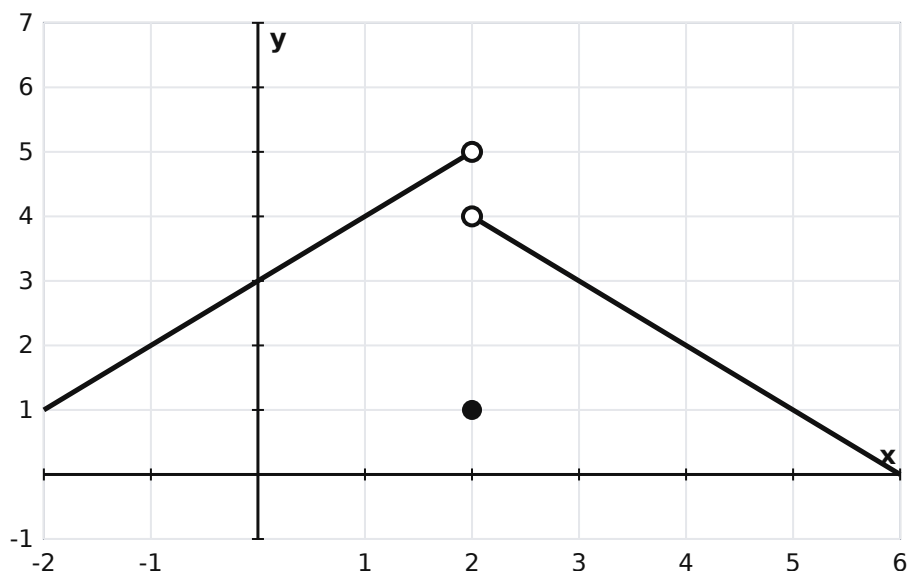
Outputs: 11.41, 11.94, 12.06, 12.61. They approach 12.

Final answer: 12.

Scoring: 1 point for a correct table; 1 point for the correct limit.

Question 2 - Reading a graph [2 pts]

- a. 5: the left piece approaches height 5.
- b. 4: the right piece starts at height 4.
- c. $f(2)=1$: the filled point.
- d. **does not exist** because $5 \neq 4$.



Graph of f near $x = 2$.

Scoring: 1 point for parts (a) and (b) both correct; 1 point for parts (c) and (d) both correct.

Question 3 - Piecewise function [2 pts]

Left: $4 - (-1)^2 = 3$. Right: $2(-1) + 5 = 3$.

Both one-sided limits equal 3, so **the limit exists and equals 3**.

Scoring: 1 point for both one-sided limits; 1 point for the conclusion with justification.

Question 4 - Parameter for a limit [3 pts]

Right-hand limit: $9 - 5 = 4$. Left-hand limit: $3k - 2$.

Set $3k - 2 = 4$, so $k = 2$. The common value is 4.

Final answer: $k = 2$, **limit 4**.

Scoring: 1 point for the right-hand limit; 1 point for the equation; 1 point for k and the limit.

Question 5 - Instantaneous speed [2 pts]

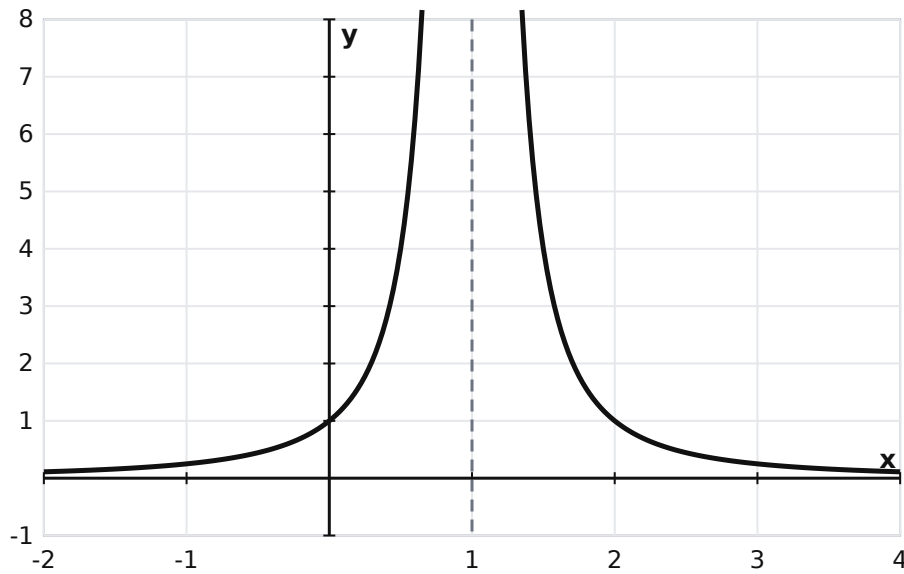
$s(2) = 20$. Averages: $\frac{s(2.1) - 20}{0.1} = 20.5, 20.05, 20.005$ meters per second.

They approach 20. Final answer: 20 m/s .

Scoring: 1 point for the three correct averages; 1 point for the estimate with units.

Question 6 - Unbounded behavior [3 pts]

- a. The outputs increase without bound from both sides.
- b. **No**. The outputs do not approach a single real number; the limit is unbounded (∞).
- c. $k(0.9) = \frac{1}{0.01} = 100$ and $k(1.1) = \frac{1}{0.01} = 100$.



The graph of $k(x) = 1/(x - 1)^2$.

Scoring: 1 point per part.

Question 7 - Taxi fare jump [3 pts]

- a. $\lim_{d \rightarrow 1^-} F(d) = 8$ and $\lim_{d \rightarrow 1^+} F(d) = 11$ dollars.
- b. **No**; the one-sided limits differ, so the fare jumps and the two-sided limit does not exist.

Scoring: 1 point for each one-sided limit; 1 point for the justified conclusion.

Question 8 - Table and conclusion [3 pts]

- a. Left-hand limit -1 ; right-hand limit 1 .
- b. **Does not exist** because $-1 \neq 1$.

x	-0.1	-0.01	-0.001	0.001	0.01	0.1
h(x)	-1	-1	-1	1	1	1

Values of h near $x = 0$.

Scoring: 1 point for each one-sided limit; 1 point for the justified conclusion.

Total
20 points