

AP Calculus AB - Evaluating Limits Algebraically - Test Answer Key

Common Core AP CALC AB 1.5, AP CALC AB 1.6, AP CALC AB 1.7, AP CALC AB 1.8 · maths-pdf.fr/en/

Use this answer key to score the limit algebra 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 1.5, AP CALC AB 1.6, AP CALC AB 1.7, AP CALC AB 1.8**

Question 1 - Substitution and limit laws [2 pts]

- a. $(-1)^3 - 4(-1) + 2 = -1 + 4 + 2 = 5$. 5
b. $\frac{6}{3} + 2(3) = 2 + 6 = 8$. 8

Scoring: 1 point per part.

Question 2 - Factoring [2 pts]

Substitution gives $\frac{0}{0}$. Factor: $\frac{(x-5)(x+2)}{x-5} = x+2$. The limit is 7.

Final answer: 7.

Scoring: 1 point for factoring and canceling; 1 point for the correct limit.

Question 3 - Rationalizing [3 pts]

Multiply by the conjugate: $\frac{(x+25)-25}{x(\sqrt{x+25}+5)} = \frac{1}{\sqrt{x+25}+5}$. Substitute $x=0$: $\frac{1}{10}$.

Final answer: $\frac{1}{10}$.

Scoring: 1 point for identifying the conjugate; 1 point for simplifying; 1 point for the limit.

Question 4 - Trigonometric limit [2 pts]

$$\frac{\sin 6x}{2x} = 3 \cdot \frac{\sin 6x}{6x} \rightarrow 3 \cdot 1 = 3.$$

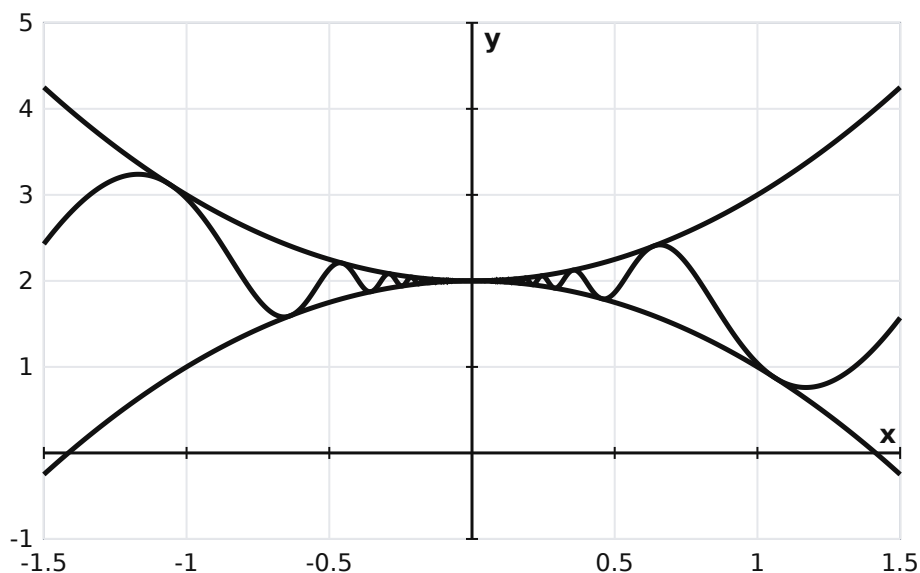
Final answer: 3.

Scoring: 1 point for rewriting with 6x in the denominator; 1 point for the limit.

Question 5 - Squeeze Theorem [3 pts]

$\lim_{x \rightarrow 0} (2 - x^2) = 2$ and $\lim_{x \rightarrow 0} (2 + x^2) = 2$. Both bounds have the same limit.

By the Squeeze Theorem, $\lim_{x \rightarrow 0} h(x) = 2$.



A function between $2 - x^2$ and $2 + x^2$.

Scoring: 1 point for each bound limit; 1 point for the conclusion naming the Squeeze Theorem.

Question 6 - Difference quotient limit [2 pts]

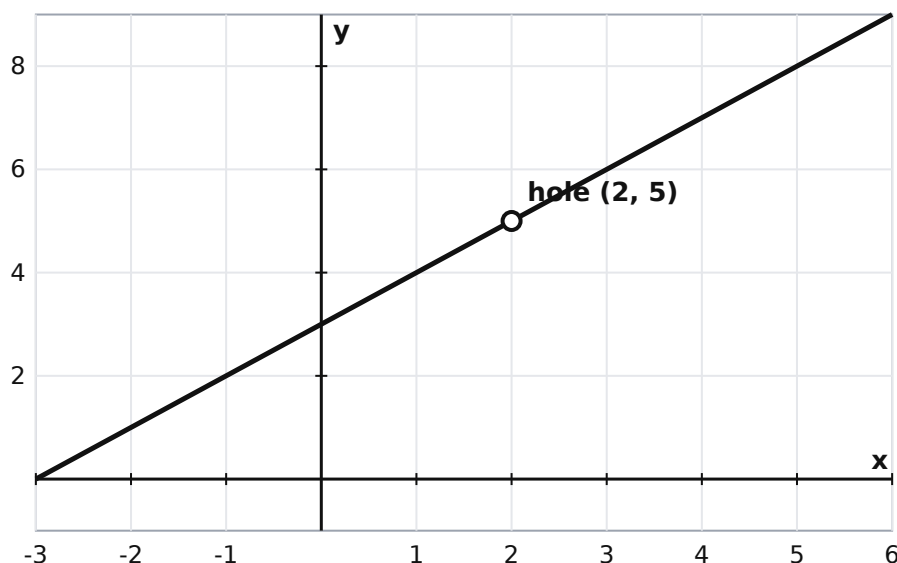
$$f(1) = 3 \text{ and } f(1+h) = 2(1+2h+h^2)+1+h = 3+5h+2h^2.$$

$$\frac{5h+2h^2}{h} = 5+2h \rightarrow 5. \text{ Final answer: 5.}$$

Scoring: 1 point for expanding and simplifying the quotient; 1 point for the limit.

Question 7 - Hole in a graph [3 pts]

- a. No. The denominator is 0 at $x=2$.
- b. $\frac{(x+3)(x-2)}{x-2} = x+3$, so the limit is 5.
- c. The graph is the line $y = x+3$ with a hole at $(2,5)$; the outputs approach height 5 from both sides.



The graph of $g(x) = (x^2 + x - 6)/(x - 2)$.

Scoring: 1 point per part.

Question 8 - Cost per item [3 pts]

- a. $\frac{144-100}{2} = 22$, so **\\$22**.
- b. $\frac{(n-10)(n+10)}{n-10} = n+10$, so the limit is **\\$20**.

Scoring: 1 point for (a); 1 point for factoring in (b); 1 point for the limit in (b).

Total

20 points