

2018 Calculus Ab Frq

AP[®] CALCULUS AB 2018 SCORING GUIDELINES

Question 1

(a) $g'(3) \approx \frac{g(5) - g(1)}{5 - 1} = \frac{20.5 - 15.1}{4} = 1.35$

At time $t = 3$ minutes, the rate at which grain is being added to the silo is increasing at a rate of 1.35 cubic feet per minute per minute.

2 : $\begin{cases} 1 : \text{approximation} \\ 1 : \text{interpretation with units} \end{cases}$

(b) The total amount of grain added to the silo from time $t = 0$ to time $t = 8$ is $\int_0^8 g(t) \, dt$ cubic feet.

$$\int_0^8 g(t) \, dt \approx g(1) \cdot (1 - 0) + g(5) \cdot (5 - 1) + g(6) \cdot (6 - 5) + g(8) \cdot (8 - 6) \\ = 15.1 \cdot 1 + 20.5 \cdot 4 + 18.3 \cdot 1 + 22.7 \cdot 2 = 160.8$$

3 : $\begin{cases} 1 : \text{integral expression} \\ 1 : \text{right Riemann sum} \\ 1 : \text{approximation} \end{cases}$

(c) $\int_0^8 u(t) \, dt \approx 99.051497$

The approximate amount of unspoiled grain remaining in the silo at time $t = 8$ is $160.8 - \int_0^8 u(t) \, dt \approx 61.749$ (or 61.748) cubic feet.

2 : $\begin{cases} 1 : \text{integral} \\ 1 : \text{answer} \end{cases}$

(d) $g(6) - u(6) = 18.3 - 16.063173 = 2.236827 > 0$

Because $g(6) - u(6) > 0$, the amount of unspoiled grain is increasing at time $t = 6$.

2 : $\begin{cases} 1 : \text{considers } g(6) - u(6) \\ 1 : \text{answer} \end{cases}$

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2018 Calculus AB FRQ: A Comprehensive Guide to Mastering the Free Response Questions

Conquering the AP Calculus AB exam is a significant academic achievement, and a substantial portion of your score hinges on the Free Response Questions (FRQs). This guide delves deep into the 2018 Calculus AB FRQs, providing detailed explanations, strategies, and insights to help you understand the questions, master the concepts, and improve your score. Whether you're preparing for the exam, reviewing past papers, or simply seeking a deeper understanding of calculus, this comprehensive analysis will serve as your invaluable resource. We'll dissect each question,

highlighting common pitfalls and demonstrating effective problem-solving techniques. Let's unlock the secrets of the 2018 Calculus AB FRQs together!

Understanding the 2018 Calculus AB FRQ Structure

The 2018 AP Calculus AB exam featured six free-response questions, each testing different aspects of the curriculum. These questions assess your ability to apply calculus concepts to solve real-world problems and demonstrate a thorough understanding of fundamental principles. Unlike multiple-choice questions, the FRQs require you to show your work, providing opportunities to earn partial credit even if your final answer is incorrect. This emphasizes the importance of clear, organized, and logical presentation.

Question 1: Differentiation and Related Rates

This question typically involves finding the derivative of a function or applying implicit differentiation. It often presents a problem involving related rates, requiring you to relate the rates of change of different variables. Mastering the chain rule and implicit differentiation is crucial for success on this type of question. Understanding how to set up and solve the related rates problem, clearly showing the steps, is key to maximizing your points.

Question 2: Integration and Accumulation

Question 2 frequently focuses on definite integrals and their applications. You might be asked to find the area under a curve, the average value of a function, or solve a problem involving accumulation. A strong understanding of the Fundamental Theorem of Calculus is essential. Practicing various integration techniques, including u-substitution, is also vital. Remember to clearly show your work, including the antiderivative and the evaluation of the definite integral.

Question 3: Differential Equations

This question usually introduces a differential equation, requiring you to find a general or particular solution. Understanding slope fields and their connection to differential equations is important. You may need to use separation of variables or other techniques to solve the equation. Pay close attention to the initial conditions provided, as they are crucial for finding the particular solution.

Question 4: Applications of Integrals

Question 4 often involves applying integrals to solve real-world problems, such as finding volumes of solids of revolution, areas between curves, or motion problems. Understanding the different methods for calculating volumes (disk, washer, shell methods) is necessary. Accurate sketching and labeling of diagrams is highly recommended, as it helps visualize the problem and aids in setting up the integral correctly.

Question 5: Contextualized Applications

This question typically presents a problem in a real-world context, requiring you to apply various calculus concepts to analyze the situation. This could involve using derivatives to analyze rates of change, integrals to calculate accumulation, or a combination of both. Reading the problem carefully and identifying the relevant information is crucial. Clearly define your variables and show your reasoning.

Question 6: More Advanced Applications

The final question often involves a more complex application of calculus concepts, potentially combining several techniques or requiring a deeper understanding of specific theorems. This question is designed to distinguish the highest-achieving students. Careful planning, meticulous work, and a strong foundation in calculus are essential for tackling this challenge effectively.

Strategies for Mastering the 2018 Calculus AB FRQs

Practice, Practice, Practice: Work through numerous past FRQs, focusing on understanding the underlying concepts.

Show Your Work: Even if you don't get the final answer, demonstrate your understanding by showing your steps.

Organize Your Solutions: Use clear and concise notation. Label diagrams and clearly indicate your final answer.

Check Your Work: Review your solutions for errors in calculation or reasoning.

Understand the Scoring Rubric: Familiarize yourself with how points are awarded to optimize your approach.

Conclusion

Mastering the 2018 Calculus AB FRQs requires a strong understanding of fundamental calculus concepts and a strategic approach to problem-solving. By focusing on clear communication, meticulous calculation, and consistent practice, you can significantly improve your performance on the exam. Remember, the key to success lies in understanding the underlying principles and applying them effectively to solve diverse problems. Use this guide as a springboard to further explore the questions and deepen your understanding of AP Calculus AB.

FAQs

1. Where can I find the actual 2018 Calculus AB FRQs? You can find the official 2018 AP Calculus AB exam, including the FRQs, on the College Board website.
2. Are there any online resources to help me practice? Many websites offer practice FRQs and solutions, including Khan Academy, AP Classroom, and various educational YouTube channels.
3. How much weight do the FRQs carry on the AP exam? The free-response section typically accounts for 50% of the total exam score.
4. What is the best way to study for the FRQs? The best approach involves a combination of conceptual understanding, problem-solving practice, and thorough review of past exams.
5. Is it possible to get partial credit on the FRQs? Yes, the AP Calculus AB scoring rubric allows for partial credit. Showing your work and demonstrating an understanding of the relevant concepts increases your chances of receiving partial credit, even if your final answer is incorrect.

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• 3

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toward helping educators teach AP® Calculus, AP® Statistics, and other math courses. Mr. Schwartz is always looking for ways to provide teachers with new and innovative teaching materials, believing that it should be the goal of every math teacher not only to teach students mathematics, but also to find joy and beauty in math as well.

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