

# 2009 Ap Calculus Ab Free Response



## AP<sup>®</sup> Calculus AB 2009 Free-Response Questions

### The College Board

The College Board is a not-for-profit membership association whose mission is to connect students to college success and opportunity. Founded in 1900, the association is composed of more than 5,600 schools, colleges, universities and other educational organizations. Each year, the College Board serves seven million students and their parents, 23,000 high schools and 3,800 colleges through major programs and services in college readiness, college admissions, guidance, assessment, financial aid, enrollment, and teaching and learning. Among its best-known programs are the SAT<sup>®</sup>, the PSAT/NMSQT<sup>®</sup> and the Advanced Placement Program<sup>®</sup> (AP<sup>®</sup>). The College Board is committed to the principles of excellence and equity, and that commitment is embodied in all of its programs, services, activities and concerns.

© 2009 The College Board. All rights reserved. College Board, Advanced Placement Program, AP, AP Central, SAT, and the acorn logo are registered trademarks of the College Board. PSAT/NMSQT is a registered trademark of the College Board and National Merit Scholarship Corporation.

Permission to use copyrighted College Board materials may be requested online at:  
[www.collegeboard.com/inquiry/cbpermit.html](http://www.collegeboard.com/inquiry/cbpermit.html).

Visit the College Board on the Web: [www.collegeboard.com](http://www.collegeboard.com).  
AP Central is the official online home for the AP Program: [apcentral.collegeboard.com](http://apcentral.collegeboard.com).

**2009 AP Calculus AB Free Response** questions are a significant part of the AP Calculus AB exam, providing students with an opportunity to demonstrate their understanding of calculus concepts and their ability to apply these concepts in various problem-solving scenarios. The free response section typically consists of a series of questions that require more than just multiple-choice answers; students must show all their work and reasoning. In this article, we will explore the 2009 AP Calculus AB Free Response questions, providing a detailed analysis of each question, the skills necessary to tackle them, and tips for succeeding on future exams.

## Overview of the 2009 AP Calculus AB Exam

The AP Calculus AB exam is divided into two main sections: multiple-choice questions and free response questions. The free response section is particularly important because it

accounts for a significant portion of the overall score. In 2009, the exam was structured into six free response questions, which tested various topics including limits, derivatives, integrals, and the Fundamental Theorem of Calculus.

## **Format of the Free Response Section**

- Total Questions: 6
- Types of Questions: Conceptual questions, computational problems, and application of calculus concepts.
- Time Allotted: 90 minutes, with no break between questions.
- Scoring: Each question is scored on a scale from 0 to 9, with partial credit often awarded for correct steps that lead to an incorrect final answer.

## **Detailed Analysis of the Free Response Questions**

The 2009 AP Calculus AB Free Response section included a range of questions that addressed fundamental calculus concepts. Here, we will break down each question and discuss the key concepts and skills required.

### **Question 1: Limits and Continuity**

This question involved evaluating limits and understanding continuity of a function. Students were required to determine the limit of a piecewise function as it approached a specific point.

Key Concepts:

- Definition of limits
- Continuity at a point
- Piecewise functions

Skills Required:

- Ability to analyze functions graphically and algebraically
- Application of limit laws
- Understanding of the epsilon-delta definition of continuity

Tips:

- Clearly show the steps taken to evaluate the limit.
- Justify each step to receive partial credit if the final answer is incorrect.

### **Question 2: Derivatives and Applications**

The second question focused on finding derivatives and applying them to real-world situations. Students were asked to analyze the motion of an object given its position

function and to determine velocity and acceleration.

Key Concepts:

- Derivative as a rate of change
- Applications of derivatives in motion
- Interpretation of velocity and acceleration

Skills Required:

- Differentiation techniques
- Understanding the physical meaning of derivatives
- Problem-solving in the context of motion

Tips:

- Include units in your final answers to demonstrate understanding of the physical context.
- Label each part of your answer clearly to avoid confusion.

### **Question 3: Integrals and Area Under a Curve**

This question required students to compute definite integrals and find the area under a curve. It also involved applying the Fundamental Theorem of Calculus.

Key Concepts:

- Definite and indefinite integrals
- Area under a curve as a definite integral
- Fundamental Theorem of Calculus

Skills Required:

- Integration techniques
- Understanding the relationship between differentiation and integration
- Application of integrals to find areas

Tips:

- Clearly state the integral setup before evaluating.
- If using numerical methods, explain your reasoning and steps.

### **Question 4: Differential Equations**

In this question, students were tasked with solving a differential equation and using it to model a real-life scenario. They had to determine the general solution and apply initial conditions to find a particular solution.

Key Concepts:

- First-order differential equations
- Initial value problems
- Application of differential equations in modeling

Skills Required:

- Solving separable differential equations
- Applying initial conditions to find specific solutions
- Understanding the context of the problem in terms of the equation

Tips:

- Show all steps in solving the differential equation for full credit.
- Be careful with notation and ensure that the final answer is clearly stated.

## **Question 5: Series and Sequences**

This question revolved around the convergence of sequences and series, challenging students to determine whether a given series converged or diverged.

Key Concepts:

- Definitions of convergence and divergence
- Various tests for convergence (e.g., ratio test, root test)
- Power series and Taylor series

Skills Required:

- Application of convergence tests
- Understanding the behavior of sequences and series
- Formulating arguments for convergence or divergence

Tips:

- Clearly state which test you are using and why.
- Justify your reasoning with appropriate mathematical rigor.

## **Question 6: Application of Calculus Concepts**

The final question often involved a real-world application of calculus concepts, such as optimization problems or related rates.

Key Concepts:

- Optimization techniques
- Related rates problems
- Application of calculus in real-world contexts

Skills Required:

- Setting up equations based on verbal descriptions
- Differentiating to find maximum or minimum values
- Solving problems involving rates of change

Tips:

- Draw diagrams where applicable to clarify the problem.
- Clearly outline your approach to finding the solution.

# Scoring and Grading Criteria

The free response section of the AP Calculus AB exam is scored based on a rubric that evaluates the correctness and completeness of students' responses. Each question is graded on several criteria:

- Correctness: Is the final answer correct?
- Process: Are the steps taken to arrive at the answer logical and mathematically sound?
- Justification: Are the reasoning and explanations clear and complete?
- Neatness: Is the work presented in a clear and organized manner?

## Preparing for Future Exams

To excel in future AP Calculus AB exams, students should consider the following tips:

1. Practice Regularly: Work through past free response questions to familiarize yourself with the format and types of questions.
2. Understand Concepts: Focus on understanding the underlying concepts rather than just memorizing procedures.
3. Show Work: Always show your calculations and reasoning, as partial credit can significantly impact your score.
4. Study Groups: Collaborate with classmates to discuss and solve problems together.
5. Seek Help: Don't hesitate to ask teachers or tutors for clarification on difficult topics.

## Conclusion

The 2009 AP Calculus AB Free Response section provided a diverse range of questions that tested students' understanding of calculus concepts and their ability to apply them effectively. By analyzing each question and understanding the required skills and strategies, students can better prepare for future exams. Mastery of calculus not only enhances problem-solving skills but also lays a strong foundation for further studies in mathematics, science, and engineering disciplines. As students approach their exams, they should aim to build confidence in their abilities through consistent practice and a solid understanding of core calculus principles.

## Frequently Asked Questions

### What topics were covered in the 2009 AP Calculus AB free response questions?

The 2009 AP Calculus AB free response questions included topics such as limits, derivatives, integrals, the Fundamental Theorem of Calculus, and applications of calculus in real-world scenarios.

## **How can students best prepare for the free response section of the AP Calculus AB exam?**

Students can best prepare by practicing past free response questions, reviewing the scoring guidelines provided by the College Board, and ensuring they understand the underlying concepts and techniques required for solving these types of problems.

## **What scoring guidelines were used for the 2009 AP Calculus AB free response questions?**

The scoring guidelines for the 2009 AP Calculus AB free response questions typically included a rubric outlining the points awarded for correct answers, clear justification of work, and appropriate use of calculus concepts.

## **What common mistakes do students make on the 2009 AP Calculus AB free response?**

Common mistakes include not showing enough work for full credit, misapplying theorems, neglecting to check endpoints in interval problems, and making algebraic errors in calculations.

## **Where can I find the official 2009 AP Calculus AB free response questions and solutions?**

The official 2009 AP Calculus AB free response questions and solutions can be found on the College Board's website, where they archive past exam materials, including question sets and scoring guidelines.

Find other PDF article:

<https://soc.up.edu.ph/47-print/pdf?docid=IZr34-7138&title=plate-boundary-worksheet-answers.pdf>

## **2009 Ap Calculus Ab Free Response**

*free after effects templates | after effects intro template | ShareAE*

Free After Effects templates. Download after effects templates, videohive templates, Video Effects and much more

### **Sharee Miller Now: Where is Bruce Miller's Wife Today? Update**

Feb 11, 2022 · Where is Sharee Miller Now? Sharee's attorney further contended that the conversations that Jerry left behind were faked, and there was no physical evidence that ...

Saree: Buy Latest Indian Sarees for Women Online | Utsav Fashion

Shop latest Indian sarees online at Utsav. Online saree shopping with us lets you choose a wide range of options and great offers on saree dresses.

## **Sharee - Future of Mobility Management**

The Sharee Mobility offers your employees the opportunity to choose from a variety of shared transportation options through a single platform, as a tax-free benefit in your cafeteria system. ...

*Indian Sarees - Bridal Wedding Sarees, Party Wear & Bollywood ...*

Buy Beautiful & Designer Indian Sarees Online For Occasions like Wedding, Party, Festivals and More From Our Exclusive Collections Of Sarees. Order Now!

## **What Happened to Sharee Miller? All About Internet Murder Case**

May 20, 2024 · Why did Sharee Miller have her husband Bruce Miller killed? Learn more about the murder and where she is now after a Snapped anniversary special.

*Sharee*

Sharee is a cross-platform file sharing tool It is easy to transfer files between multiple devices

## **Sharee - Employee Advocacy Platform / Social Selling / Internal ...**

Amplify your brand's reach on social networks with an Employee Advocacy program and boost your employees engagement. Sharee Advocacy by So-Buzz.

*Sari - Wikipedia*

An Indian woman dressed in a sari. A sari (also called sharee, saree[1] or sadi) [note 1] is a drape (cloth) [2] and a women's garment in the Indian subcontinent. [3] It consists of an un-stitched ...

## **Buy Latest Indian Sarees Online - Panash India**

Shop Indian sarees online. Discover the wide range of designer sarees in different colors, prints, patterns, and work at Panash India. Custom Stitching & free worldwide shipping.

## **2025 VW Tiguan: Compact Family SUV | Volkswagen**

Elevate family journeys with the Volkswagen Tiguan - the essential family SUV. Compact and spacious, stylish, and safe for unforgettable adventures.

*2025 Volkswagen Tiguan Prices, Reviews, and Pictures | Edmunds*

Research the 2025 Volkswagen Tiguan with our expert reviews and ratings. Edmunds also has Volkswagen Tiguan pricing, MPG, specs, pictures, safety features, consumer reviews and ...

*2025 Volkswagen Tiguan Review, Pricing, and Specs*

An all-new, third-generation 2025 VW Tiguan makes its debut with an increase in engine power but without the third row of its predecessor.

*I Drove the 2025 Volkswagen Tiguan. Here's My Brutally Honest ...*

Jun 26, 2025 · Is the 2025 Volkswagen Tiguan the perfect compact SUV? My brutally honest review digs into what's great—and what's not—about its new design, tech, and performance ...

Explore the 2009 AP Calculus AB free response questions and detailed solutions. Boost your exam prep and enhance your understanding. Learn more now!

[Back to Home](#)