JEE MAIN INTEGRATION PRACTICE TEST (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

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How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

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Questions

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1. What is the process of finding the antiderivative called?

A. Integration

B. Differentiation

C. Substitution

D. Factorization

2. What is the derivative of ln(x) with respect to x?

A. 1/x

B. x

C. ln(x)/x

D. x^2

3. Which symbol is commonly used to denote an integral?

A. ∑

B. ∫

C. ∂

D. Δ

4. What is the value of the definite integral ∫ from 1 to 2 of (3x^2) dx?

A. 7

B. 5

C. 3

D. 9

5. What is the integral of sinh(x) dx?

A. cosh(x) + C

B. sinh(x) + C

C. tan(x) + C

D. e^x/2 + C

6. What is the result of the integral ∫ (sin(x) + cos(x)) dx?

A. -cos(x) + sin(x) + C

B. sin(x) - cos(x) + C

C. cos(x) + sin(x) + C

D. -sin(x) - cos(x) + C

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7. What is the integral of the constant 7 with respect to x?

A. 7x + C

B. 7/x + C

C. 7 + C

D. ln(7x) + C

8. What is ∫ (x^3 e^x) dx using integration by parts?

A. (x^3 - 3x^2 + 6x - 6)e^x + C

B. (x^3 + 3x^2 + 6x)e^x + C

C. (x^3 - 2x^2 + 6x + 1)e^x + C

D. (x^3 - 3x + 6)e^x + C

9. What is the fundamental role of three times the mathematical constant π (3π)?

A. It defines a linear equation

B. It represents the circumference of a circle

C. It serves as a value in trigonometric identities

D. It is a multiplicative factor in integration

10. What is the result of integrating (1/x) with respect to x?

A. ln|x| + C

B. e^x + C

C. x + C

D. 1/x + C

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Answers

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1. A
2. A
3. B
4. A
5. A
6. A
7. A
8. A
9. B
10. A

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Explanations

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1. What is the process of finding the antiderivative called?

A. Integration

B. Differentiation

C. Substitution

D. Factorization

The process of finding the antiderivative is known as integration. When you integrate a function, you are effectively reversing the process of differentiation, allowing you to retrieve original functions from their derivatives. Integration is a fundamental concept in calculus and has widespread applications in areas such as physics, engineering, and economics. When seeking an antiderivative, you apply the rules of integration, which include various techniques like substitution, but substitution itself is not the name of the process; it is merely a method used within integration. Differentiation, on the other hand, is concerned with finding the derivative, which is the opposite operation to integration. Factorization involves breaking down expressions into their multiplicative components and does not pertain to finding antiderivatives. Thus, integration is indeed the correct term that encompasses the overall process of determining antiderivatives.

2. What is the derivative of ln(x) with respect to x?

A. 1/x

B. x

C. ln(x)/x

D. x^2

The derivative of the natural logarithm function, ln(x), with respect to x is 1/x. This result is derived from the rules of calculus, specifically utilizing the concept of limits and the definition of a derivative. To understand why this is the case, we can start from the definition of the derivative, which is the limit of the difference quotient: $$\frac{d}{dx} \ln(x) = \lim_{h \to 0} \frac{\ln(x + h) - \ln(x)}{h}$$ Using the properties of logarithms, we can rewrite the difference of logarithms: $$\ln(x + h) - \ln(x) = \ln\left(\frac{x + h}{x}\right) = \ln\left(1 + \frac{h}{x}\right)$$ As h approaches 0, we can apply the Taylor series expansion or the property that $\ln(1 + u) \approx u$ when u is small. Therefore, we can simplify it further: $$\lim_{h \to 0} \frac{\ln\left(1 + \frac{h}{x$

3. Which symbol is commonly used to denote an integral?

A. ∑

B. ∫

C. ∂

D. Δ

The symbol commonly used to denote an integral is indeed ∫. This symbol is derived from the Latin word "summa," which emphasizes the concept of integration as a summation of infinitesimally small parts over an interval. When we compute an integral, we are essentially finding the area under a curve or the accumulation of quantities over a certain range. In calculus, this is central to understanding both definite and indefinite integrals, where ∫ indicates the operation of taking the integral of a function. The integral symbol is a fundamental notation that permeates various applications in mathematics, physics, and engineering, highlighting its significance in both theoretical and practical applications. The other symbols mentioned serve different purposes in mathematics: ∑ represents summation, often used in series and sequences; ∂ indicates partial derivatives, critical in multivariable calculus; and Δ is typically used to signify change or difference, such as in the context of limits or differences in variables. Each of these has its distinct role, but none are used to denote integration.

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4. What is the value of the definite integral ∫ from 1 to 2 of (3x^2) dx?

A. 7

B. 5

C. 3

D. 9

To find the value of the definite integral ∫ from 1 to 2 of (3x^2) dx, we start by calculating the indefinite integral of the function 3x². The integral of 3x² with respect to x is: ∫ 3x² dx = (3/3)x^3 + C = x^3 + C Now we apply the Fundamental Theorem of Calculus to evaluate the definite integral from the limits 1 to 2: ∫ from 1 to 2 of (3x^2) dx = [x^3] from 1 to 2 = (2^3) - (1^3) = 8 - 1 = 7 Thus, the value of the definite integral is 7. The computed result shows how the definite integral is a measure of the net area under the curve from x = 1 to x = 2. Given this procedure and outcome, the correct answer is indeed 7, consistent with the calculations.

5. What is the integral of sinh(x) dx?

A. cosh(x) + C

B. sinh(x) + C

C. tan(x) + C

D. e^x/2 + C

The integral of sinh(x) dx is cosh(x) + C because of the relationship between the hyperbolic sine and hyperbolic cosine functions. To understand why this is the case, recall the definitions of the hyperbolic functions: - The hyperbolic sine function is defined as $\sinh(x) = \frac{e^x - e^{-x}}{2}$. - The hyperbolic cosine function is defined as $\cosh(x) = \frac{e^x + e^{-x}}{2}$. When you differentiate cosh(x), you find that $\frac{d}{dx} \cosh(x) = \sinh(x)$. This means that the antiderivative, or the integral, of sinh(x) must be cosh(x) plus a constant of integration (C). Therefore, when performing the integral, you ascertain: $$\int \sinh(x) \, dx = \cosh(x) + C$$ Thus, the answer is confirmed as cosh(x) + C, demonstrating a direct connection between differentiation and integration when dealing with these hyperbolic functions.

6. What is the result of the integral ∫ (sin(x) + cos(x)) dx?

A. -cos(x) + sin(x) + C

B. sin(x) - cos(x) + C

C. cos(x) + sin(x) + C

D. -sin(x) - cos(x) + C

To solve the integral ∫(sin(x) + cos(x))dx, we can break it down into two separate integrals: 1. The integral of sin(x) with respect to x is -cos(x). 2. The integral of cos(x) with respect to x is sin(x). Putting these results together, we have: ∫(sin(x) + cos(x))dx = ∫sin(x)dx + ∫cos(x)dx = -cos(x) + sin(x) + C Here, C is the constant of integration that arises because we are finding an indefinite integral. Therefore, the correct answer is the expression -cos(x) + sin(x) + C which accurately represents the outcome of the integration process.

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7. What is the integral of the constant 7 with respect to x?

A. 7x + C

B. 7/x + C

C. 7 + C

D. ln(7x) + C

The integral of a constant can be determined using the basic principle of integration. When you integrate a constant 'k' with respect to a variable 'x', the result is k times the variable, plus a constant of integration, typically denoted as C. In this case, since the constant is 7, the integral can be calculated as follows: \[\int 7 \, dx = 7x + C \] This matches the correct answer, as it captures the essence of integrating a constant by multiplying it by the variable (x) and adding the constant of integration (C). The other options present alternative forms that do not correspond to the process of integrating a constant with respect to x. For instance, the second option suggests a division by x, which is not relevant in this context. The third option merely adds a constant to 7 without involving x, while the fourth option introduces a natural logarithm, which is entirely unrelated to the integration of a constant. Thus, the first option accurately reflects the correct method of integrating a constant, making it the right choice.

8. What is ∫ (x^3 e^x) dx using integration by parts?

A. (x^3 - 3x^2 + 6x - 6)e^x + C

B. (x^3 + 3x^2 + 6x)e^x + C

C. (x^3 - 2x^2 + 6x + 1)e^x + C

D. (x^3 - 3x + 6)e^x + C

To find the integral of \(\int x^3 e^x \, dx \) using the method of integration by parts, we start with the formula: \[\int u \, dv = uv - \int v \, du \] For our integral, we can choose \(u = x^3 \) and \(dv = e^x \, dx \). This means we need to differentiate \(u \) and integrate \(dv \): - Differentiating \(u \): \[du = 3x^2 \, dx \] - Integrating \(dv \): \[v = e^x \] Now we can apply the integration by parts formula: \[\int x^3 e^x \, dx = x^3 e^x - \int e^x \cdot 3x^2 \, dx \] Next, we need to compute the integral \(\int 3x^2 e^x \, dx \). We will again use integration by parts on this integral. Set \(u = x^2 \) and \(dv = 3e^x \, dx \): - Differentiating \(u

9. What is the fundamental role of three times the mathematical constant π (3π)?

A. It defines a linear equation

B. It represents the circumference of a circle

C. It serves as a value in trigonometric identities

D. It is a multiplicative factor in integration

The fundamental role of three times the mathematical constant π (3π) lies in its connection to the circumference of a circle. The value of π itself is defined as the ratio of a circle's circumference to its diameter. Thus, when multiplied by 3, 3π represents the circumference of a circle whose diameter is 3 units. In this context, you can visualize a circle with a diameter of 3; its circumference would be calculated as π times the diameter, which yields the result 3π. This relationship is foundational in geometry and helps in understanding properties of circles and their measurements. As for the other options, while they may relate to different mathematical concepts, they do not accurately describe the specific significance of 3π. For instance, linear equations do not inherently involve π, trigonometric identities may use π but do not focus on the factor of 3π specifically, and although it may arise as a multiplicative factor in integration, this too does not capture the primary importance of 3π as a measurement of circumference in a geometric setting.

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10. What is the result of integrating (1/x) with respect to x?

A. ln|x| + C

B. e^x + C

C. x + C

D. 1/x + C

The integration of $\frac{1}{x}$ with respect to x leads to the natural logarithm function, specifically $\ln|x|$. The reason for this stems from the fundamental properties of logarithmic functions and their derivatives. When differentiating $\ln|x|$, we apply the chain rule. The derivative of $\ln|x|$ is $\frac{1}{x}$. This fact confirms that when you reverse the differentiation process through integration, the integral of $\frac{1}{x}$ indeed yields $\ln|x| + C$, where C represents the constant of integration. This function, $\ln|x|$, is defined for all non-zero values of x, which is important to consider when evaluating the integral over its domain. The absolute value notation, $|x|$, ensures that the logarithm remains valid for both positive and negative values of x (except at zero, which is undefined). In summary, the integration of $\frac{1}{x}$ correctly gives you $\ln|x| + C$, cementing its role in

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Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://jeemainintegration.examzify.com

We wish you the very best on your exam journey. You've got this!

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