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MATHEMATICS · JEE MAIN

Indefinite Integration

Previous Year Questions with answers

110 questions · **108** papers · **2004–2026** · newest paper first

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What is in this PDF: every Indefinite Integration question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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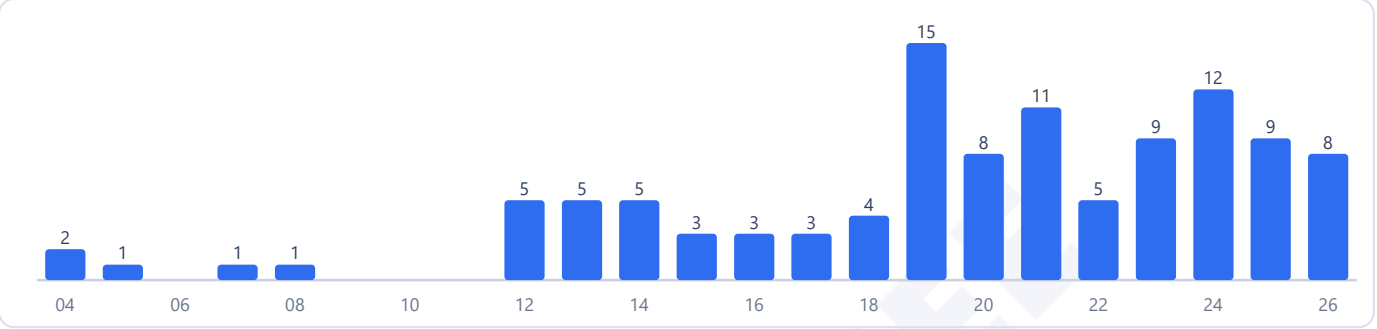
Chapter at a glance

1.7%	110	76 of 162	93 / 17
of Mathematics questions, 2019–2026	questions, 2004–2026	papers asked it, 2019–2026	MCQ / numerical, 2004–2026

Trend. Steady: 0.5 questions per paper in 2024–2026 against 0.5 in 2019–2023.

Questions per year



Counts are the questions we hold: 110 in 108 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2004–2026)



How often it comes up

Indefinite integration equips students with algebraic techniques to find antiderivatives under Unit 8: Integral Calculus in the Class 12 curriculum, placing it at rank 25 among the 29 chapters in the subject. Between 2019 and 2026, the examination featured 77 questions from this chapter across 162 papers, representing 1.7 percent of all mathematics questions. It appeared in 76 of those papers and has been asked every year since 2019. Over the recent three-year window of 2024 to 2026, 29 questions were asked across 58 papers, averaging 0.5 questions per paper with a 1.9 percent subject share. Comparing the earlier 2002 to 2018 share of 2.5 percent to the recent 2024 to 2026 level shows that its long-term share is down, whereas the comparison between 2019 to 2026 and 2024 to 2026 indicates that it is about the same. Across the complete archive from 2004 to 2026 spanning 200 papers, 110 questions appeared across 108 papers, including 17 numerical answer questions between 2019 and 2026.

Students typically encounter an antiderivative question in about every second paper. In 2024, 2025, and 2026, the question tallies were 12, 9, and 8 questions respectively.

Even though its standalone volume ranks near the lower quarter of mathematics chapters, indefinite integration techniques underpin definite integrals, area evaluations, and differential equations. Examiners frequently formulate problems by defining a function as an indefinite integral with a boundary condition, requiring candidates to find an antiderivative before evaluating the function at a specific point.

Most-asked topics

Antiderivative problems in JEE Main cluster across five primary methods:

1. **Standard Integrals & Substitution (39 questions, 2019-2026; 51 total, last asked 2026)** The largest category covers clever algebraic substitutions, converting trigonometric expressions into powers of tangent or cotangent, and factoring out high powers of x from radical denominators to reveal standard derivative structures.

2. **Integration by Parts (16 questions, 2019-2026; 20 total, last asked 2026)** Focuses on product forms combining polynomials with trigonometric or exponential terms. A recurring pattern involves the exponential product form where the integrand splits into the sum of a function and its derivative multiplied by an exponential factor.

3. **Trigonometric Integrals (8 questions, 2019-2026; 20 total, last asked 2026)** Involves manipulating powers and products of sines, cosines, tangents, and secants using half-angle formulas, symmetric identities, and auxiliary angle methods.

4. **Special Techniques (7 questions, 2019-2026; 10 total, last asked 2026)** Encompasses quadratic surds in the denominator, Euler-style linear substitutions under radicals, and symmetric algebraic forms such as expressions with reciprocal quadratic terms.

5. **Partial Fractions & Rational Functions (7 questions, 2019-2026; 9 total, last asked 2026)** Deals with decomposing rational functions into basic denominators. Questions often require completing the square or separating linear factors before applying standard logarithmic or inverse tangent antiderivatives.

What the questions look like

Antiderivative questions set by the NTA regularly test specific structural patterns:

- **Factoring Out Leading Powers**: The integrand contains a polynomial inside a fractional power in the denominator. Factoring out the dominant power produces an expression whose derivative matches the numerator up to a constant scalar.
- **Exponential with Function and Derivative**: An integrand of the form e^x multiplied by an algebraic expression decomposes into a function plus its exact derivative, allowing the integral to collapse into e^x multiplied by that function.
- **Trigonometric Reduction to Tangent and Secant**: Denominators feature quadratic or quartic combinations of sine and cosine. Dividing the numerator and denominator by cosine squared transforms the integral into an algebraic substitution in terms of tangent.
- **Function Defined by Antiderivative with Initial Value**: The problem defines f(x) as an antiderivative satisfying a given value at an initial argument, then asks for the value of f at another point.

How to practise it

Solving indefinite integrals reliably requires proactive pattern recognition:

- **Look for the derivative in the numerator**: Before embarking on elaborate transformations, inspect whether the numerator can be rewritten as the derivative of any portion of the denominator, either directly or after dividing numerator and denominator by an appropriate power of x.
- **Split exponential integrands**: When e^x appears multiplied by a rational or radical bracket, check whether the bracket splits into two terms where the second is the derivative of the first. If so, avoid integration by parts and apply the standard exponential identity directly.
- **Substitute auxiliary trigonometric variables**: For expressions containing differences of squares under square roots, consider standard trigonometric substitutions using sine, secant, or tangent to eliminate radicals cleanly.
- **Determine the integration constant promptly**: When an initial functional condition is specified, solve for the constant of integration immediately upon completing the antiderivative to avoid forgetting it during subsequent numerical evaluations.

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Q1 JEE Main 2026 · 2 Apr · Shift 2 MCQ

Let $f(x)=\int\left(\frac{16x+24}{x^2+2x-15}\right)dx$. If $f(4)=14\log_e(3)$ and $f(7)=\log_e\left(2^\alpha\cdot 3^\beta\right)$, $\alpha,\beta\in\mathbf{N}$, then $\alpha+\beta$ is equal to :

(A) 31
(B) 37
(C) 39
(D) 41

Answer: (C) 39 · Official NTA final key

Q2 JEE Main 2026 · 28 Jan · Shift 1 MCQ

If $\int\left(\frac{1-5\cos^2 x}{\sin^5 x\cos^2 x}\right)dx=f(x)+\mathrm{C}$, where C is the constant of integration, then $f\left(\frac{\pi}{6}\right)-f\left(\frac{\pi}{4}\right)$ is equal to

(A) $\frac{1}{\sqrt{3}}\left(26-\sqrt{3}\right)$
(B) $\frac{1}{\sqrt{3}}\left(26+\sqrt{3}\right)$
(C) $\frac{4}{\sqrt{3}}\left(8-\sqrt{6}\right)$
(D) $\frac{2}{\sqrt{3}}\left(4+\sqrt{6}\right)$

Answer: (C) $\frac{4}{\sqrt{3}}\left(8-\sqrt{6}\right)$ · Official NTA final key

Q3 JEE Main 2026 · 28 Jan · Shift 2 MCQ

Let $f(x)=\int\frac{dx}{x^{\left(\frac{2}{3}\right)}+2x^{\left(\frac{1}{2}\right)}}$ be such that $f(0)=-26+24\log_e(2)$. If $f(1)=\mathrm{a}+\mathrm{b}\log_e(3)$, where $\mathrm{a},\mathrm{b}\in\mathbf{Z}$, then $\mathrm{a}+\mathrm{b}$ is equal to :

(A) -11
(B) -5
(C) -26
(D) -18

Answer: (A) -11 · Official NTA final key

Q4 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Let $f(t)=\int\left(\frac{1-\sin(\log_e t)}{1-\cos(\log_e t)}\right)dt$, $t>1$.

If $f\left(e^{\pi/2}\right)=-e^{\pi/2}$ and $f\left(e^{\pi/4}\right)=\alpha\, e^{\pi/4}$, then α equals

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(A) $-1+\sqrt{2}$
(B) $-1-2\sqrt{2}$
(C) $-1-\sqrt{2}$
(D) $1+\sqrt{2}$

Answer: (C) $-1-\sqrt{2}$ · Official NTA final key

Q5 JEE Main 2026 · 24 Jan · Shift 2 MCQ

Let $f(x)=\int \frac{7x^{10}+9x^{8}}{\left(1+x^{2}+2x^{9}\right)^{2}}\,dx$, $x>0$, $\lim\limits_{x\to 0} f(x)=0$ and $f(1)=\frac{1}{4}$.

If $\mathrm{A}=\begin{bmatrix}0 & 0 & 1\\ \frac{1}{4} & f'(1) & 1\\ \alpha^{2} & 4 & 1\end{bmatrix}$ and $\mathrm{B}=\mathrm{adj}(\mathrm{adj}\,\mathrm{A})$ be such that $|\mathrm{B}|=81$, then α^{2} is equal to

(A) 1
(B) 2
(C) 3
(D) 4

Answer: (D) 4 · Official NTA final key

Q6 JEE Main 2026 · 23 Jan · Shift 1 MCQ

Let $f(x)=\int \frac{(2-x^{2})\cdot e^{x}}{\left(\sqrt{1+x}\right)(1-x)^{3/2}}\,dx$. If $f(0)=0$, then $f\left(\frac{1}{2}\right)$ is equal to :

(A) $\sqrt{2e}-1$
(B) $\sqrt{3e}-1$
(C) $\sqrt{3e}+1$
(D) $\sqrt{2e}+1$

Answer: (B) $\sqrt{3e}-1$ · Official NTA final key

Q7 JEE Main 2026 · 23 Jan · Shift 2 MCQ

Let $\mathrm{I}(x)=\int \frac{3\,dx}{(4x+6)\left(\sqrt{4x^{2}+8x+3}\right)}$ and $\mathrm{I}(0)=\frac{\sqrt{3}}{4}+20$. If $\mathrm{I}\left(\frac{1}{2}\right)=\frac{a\sqrt{2}}{b}+c$, where $a,b,c\in\mathbb{N}$, $\gcd(a,b)=1$, then $a+b+c$ is equal to

(A) 29
(B) 28
(C) 30
(D) 31

Answer: (D) 31 · Official NTA final key

Q8 JEE Main 2026 · 22 Jan · Shift 1 Numerical

If $\int (\sin x)^{\frac{-11}{2}} (\cos x)^{\frac{-5}{2}} dx = -\frac{p_1}{q_1}(\cot x)^{\frac{9}{2}} - \frac{p_2}{q_2}(\cot x)^{\frac{5}{2}} - \frac{p_3}{q_3}(\cot x)^{\frac{1}{2}} + \frac{p_4}{q_4}(\cot x)^{\frac{-3}{2}} + \mathrm{C}$, where p_i and q_i are positive integers with $\gcd(p_i, q_i) = 1$ for $i = 1, 2, 3, 4$ and C is the constant of integration, then $\frac{15\, p_1 p_2 p_3 p_4}{q_1 q_2 q_3 q_4}$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 16. · Official NTA final key

Q9 JEE Main 2025 · 7 Apr · Shift 2 Numerical

If $\int \left(\frac{1}{x} + \frac{1}{x^3}\right) \left(\sqrt[23]{3x^{-24} + x^{-26}}\right) dx = -\frac{\alpha}{3(\alpha+1)} \left(3x^{\beta} + x^{\gamma}\right)^{\frac{\alpha+1}{\alpha}} + C, x > 0, (\alpha, \beta, \gamma \in \mathbf{Z})$, where C is the constant of integration, then $\alpha + \beta + \gamma$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 19. · Key from source paper

Q10 JEE Main 2025 · 4 Apr · Shift 2 Numerical

If $\int \frac{\left(\sqrt{1+x^2}+x\right)^{10}}{\left(\sqrt{1+x^2}-x\right)^{9}} \mathrm{d}x = \frac{1}{m}\left(\left(\sqrt{1+x^2}+x\right)^{n}\left(\pi\sqrt{1+x^2}-x\right)\right) + C$ where C is the constant of integration and, $m, n \in \mathbf{N}$, then $m + n$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 379. · Key from source paper

Q11 JEE Main 2025 · 3 Apr · Shift 1 MCQ

Let $f(x) = \int x^3\sqrt{3 - x^2}dx$. If $5f(\sqrt{2}) = -4$, then $f(1)$ is equal to

(A) $-\frac{2\sqrt{2}}{5}$
(B) $-\frac{8\sqrt{2}}{5}$
(C) $-\frac{6\sqrt{2}}{5}$
(D) $-\frac{4\sqrt{2}}{5}$

Answer: (C) $-\frac{6\sqrt{2}}{5}$ · Key from source paper

Q12 JEE Main 2025 · 2 Apr · Shift 2 MCQ

$4\int_0^1 \left(\frac{1}{\sqrt{3+x^2}+\sqrt{1+x^2}}\right) dx - 3\log_e(\sqrt{3})$ is equal to :

(A) $2-\sqrt{2}+\log_e(1+\sqrt{2})$
(B) $2-\sqrt{2}-\log_e(1+\sqrt{2})$
(C) $2+\sqrt{2}-\log_e(1+\sqrt{2})$
(D) $2+\sqrt{2}+\log_e(1+\sqrt{2})$

Answer: (B) $2-\sqrt{2}-\log_e(1+\sqrt{2})$ · Key from source paper

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Q13 JEE Main 2025 · 28 Jan · Shift 2 MCQ

If $f(x)=\int \frac{1}{x^{1/4}\left(1+x^{1/4}\right)}\mathrm{d}x$, $f(0)=-6$, then $f(1)$ is equal to :

(A) $4\left(\log_e 2-2\right)$
(B) $2-\log_{e^2} 2$
(C) $\log_e 2+2$
(D) $4\left(\log_e 2+2\right)$

Answer: (A) $4\left(\log_e 2-2\right)$ · Key from source paper

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Q14 JEE Main 2025 · 24 Jan · Shift 2 Numerical

If $\int \frac{2x^2+5x+9}{\sqrt{x^2+x+1}}\,\mathrm{d}x = x\sqrt{x^2+x+1}+\alpha\sqrt{x^2+x+1}+\beta\log_e\left|x+\frac{1}{2}+\sqrt{x^2+x+1}\right|+\mathrm{C}$, where C is the constant of integration, then $\alpha+2\beta$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 16. · Key from source paper

Q15 JEE Main 2025 · 23 Jan · Shift 1 MCQ

Let $\mathrm{I}(x)=\int \frac{dx}{(x-11)^{\frac{11}{13}}(x+15)^{\frac{15}{13}}}$. If $\mathrm{I}(37)-\mathrm{I}(24)=\frac{1}{4}\left(\frac{1}{\mathrm{b}^{\frac{1}{13}}}-\frac{1}{\mathrm{c}^{\frac{1}{13}}}\right)$, $\mathrm{b},\mathrm{c}\in\mathrm{N}$, then $3(\mathrm{b}+\mathrm{c})$ is equal to

(A) 22
(B) 39
(C) 40
(D) 26

Answer: (B) 39 · Key from source paper

Q16 JEE Main 2025 · 23 Jan · Shift 2 MCQ

Let $\int x^3\sin x\,\mathrm{d}x=g(x)+C$, where C is the constant of integration. If $8\left(g\left(\frac{\pi}{2}\right)+g'\left(\frac{\pi}{2}\right)\right)=\alpha\pi^3+\beta\pi^2+\gamma$, $\alpha,\beta,\gamma\in Z$, then $\alpha+\beta-\gamma$ equals :

(A) 48
(B) 55
(C) 62
(D) 47

Answer: (B) 55 · Key from source paper

Q17 JEE Main 2025 · 22 Jan · Shift 2 MCQ

If $\int e^x \left(\frac{x \sin^{-1} x}{\sqrt{1-x^2}} + \frac{\sin^{-1} x}{(1-x^2)^{3/2}} + \frac{x}{1-x^2}\right) dx = g(x) + C$, where C is the constant of integration, then $g\left(\frac{1}{2}\right)$ equals :

(A) $\frac{\pi}{4}\sqrt{\frac{e}{3}}$
(B) $\frac{\pi}{6}\sqrt{\frac{e}{3}}$
(C) $\frac{\pi}{4}\sqrt{\frac{e}{2}}$
(D) $\frac{\pi}{6}\sqrt{\frac{e}{2}}$

Answer: (B) $\frac{\pi}{6}\sqrt{\frac{e}{3}}$ · Key from source paper

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Q18 JEE Main 2024 · 9 Apr · Shift 1 MCQ

Let $\int \frac{2-\tan x}{3+\tan x} dx = \frac{1}{2}(\alpha x + \log_e |\beta \sin x + \gamma \cos x|) + C$, where C is the constant of integration. Then $\alpha + \frac{\gamma}{\beta}$ is equal to :

(A) 7
(B) 4
(C) 1
(D) 3

Answer: (B) 4 · Key from source paper

Q19 JEE Main 2024 · 9 Apr · Shift 2 MCQ

The value of the integral $\int_{-1}^{2} \log_e \left(x + \sqrt{x^2+1}\right) dx$ is

(A) $\sqrt{5} - \sqrt{2} + \log_e \left(\frac{7+4\sqrt{5}}{1+\sqrt{2}}\right)$
(B) $\sqrt{5} - \sqrt{2} + \log_e \left(\frac{9+4\sqrt{5}}{1+\sqrt{2}}\right)$
(C) $\sqrt{2} - \sqrt{5} + \log_e \left(\frac{7+4\sqrt{5}}{1+\sqrt{2}}\right)$
(D) $\sqrt{2} - \sqrt{5} + \log_e \left(\frac{9+4\sqrt{5}}{1+\sqrt{2}}\right)$

Answer: (D) $\sqrt{2} - \sqrt{5} + \log_e \left(\frac{9+4\sqrt{5}}{1+\sqrt{2}}\right)$ · Key from source paper

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Q20 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Let $I(x) = \int \frac{6}{\sin^2 x (1-\cot x)^2} dx$. If $I(0) = 3$, then $I\left(\frac{\pi}{12}\right)$ is equal to

(A) $2\sqrt{3}$
(B) $\sqrt{3}$
(C) $3\sqrt{3}$
(D) $6\sqrt{3}$

Answer: (C) $3\sqrt{3}$ · Key from source paper

Q21 JEE Main 2024 · 8 Apr · Shift 2 · Numerical

If $\int \frac{1}{\sqrt[5]{(x-1)^4(x+3)^6}}\,dx = \mathrm{A}\left(\frac{\alpha x-1}{\beta x+3}\right)^B + \mathrm{C}$, where C is the constant of integration, then the value of $\alpha + \beta + 20\mathrm{AB}$ is _____

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q22 JEE Main 2024 · 6 Apr · Shift 2 · MCQ

If $\int \frac{1}{a^2\sin^2 x + b^2\cos^2 x}\,dx = \frac{1}{12}\tan^{-1}(3\tan x) +$ constant, then the maximum value of $a\sin x + b\cos x$, is :

(A) $\sqrt{40}$
(B) $\sqrt{41}$
(C) $\sqrt{39}$
(D) $\sqrt{42}$

Answer: (A) $\sqrt{40}$ · Key from source paper

Q23 JEE Main 2024 · 5 Apr · Shift 1 · MCQ

The integral $\int_0^{\pi/4} \frac{136\sin x}{3\sin x + 5\cos x}\,dx$ is equal to :

(A) $3\pi - 50\log_e 2 + 20\log_e 5$
(B) $3\pi - 25\log_e 2 + 10\log_e 5$
(C) $3\pi - 10\log_e(2\sqrt{2}) + 10\log_e 5$
(D) $3\pi - 30\log_e 2 + 20\log_e 5$

Answer: (A) $3\pi - 50\log_e 2 + 20\log_e 5$ · Key from source paper

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Q24 JEE Main 2024 · 4 Apr · Shift 1 · Numerical

If $\int_0^{\frac{\pi}{4}} \frac{\sin^2 x}{1+\sin x\cos x}\,dx = \frac{1}{a}\log_e\left(\frac{a}{3}\right) + \frac{\pi}{b\sqrt{3}}$, where a, b $\in \mathbf{N}$, then a + b is equal to _____

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q25 JEE Main 2024 · 4 Apr · Shift 2 · Numerical

If $\int \mathrm{cosec}^5 x\,dx = \alpha\cot x\,\mathrm{cosec}\,x\left(\mathrm{cosec}^2 x + \frac{3}{2}\right) + \beta\log_e\left|\tan\frac{x}{2}\right| + C$ where $\alpha, \beta \in \mathbb{R}$ and C is the constant of integration, then the value of $8(\alpha+\beta)$ equals _____

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q26 JEE Main 2024 · 31 Jan · Shift 1 Numerical

If the integral $525\int_0^{\frac{\pi}{2}} \sin 2x\ \cos^{\frac{11}{2}} x\, 1+\cos^{\frac{5}{2}} x^{\frac{1}{2}}\, dx$ is equal to $n\sqrt{2}-64$, then n is equal to _____.

Numerical value type: the answer is a number.

Answer: 176. · Key from source paper

Q27 JEE Main 2024 · 29 Jan · Shift 1 MCQ

For $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, if $y(x)=\int \frac{\operatorname{cosec} x+\sin x}{\operatorname{cosec} x \sec x+\tan x \sin^2 x}dx$ and $\lim_{x\to\left(\frac{\pi}{2}\right)^-} y(x)=0$ then $y\left(\frac{\pi}{4}\right)$ is equal to

(A) $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

(B) $\frac{1}{2}\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

(C) $-\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

(D) $\frac{1}{\sqrt{2}}\tan^{-1}\left(-\frac{1}{2}\right)$

Answer: (D) $\frac{1}{\sqrt{2}}\tan^{-1}\left(-\frac{1}{2}\right)$ · Key from source paper

Q28 JEE Main 2024 · 29 Jan · Shift 2 MCQ

If $\int \frac{\sin^{\frac{3}{2}} x+\cos^{\frac{3}{2}} x}{\sqrt{\sin^3 x \cos^3 x \sin(x-\theta)}}\,dx = A\sqrt{\cos\theta \tan x-\sin\theta}+B\sqrt{\cos\theta-\sin\theta\cot x}+C$, where C is the integration constant, then AB is equal to

(A) $4\operatorname{cosec}(2\theta)$

(B) $4\sec\theta$

(C) $2\sec\theta$

(D) $8\operatorname{cosec}(2\theta)$

Answer: (D) $8\operatorname{cosec}(2\theta)$ · Key from source paper

Q29 JEE Main 2024 · 27 Jan · Shift 2 MCQ

The integral $\int \frac{x^8-x^2\,dx}{x^{12}+3x^6+1\tan^{-1}x^3+\frac{1}{x^3}}$ is equal to :

(A) $\log\tan^{-1}x^3+\frac{1}{x^3}^{\frac{1}{3}}+C$

(B) $\log_e\tan^{-1}x^3+\frac{1}{x^3}^{\frac{1}{2}}+C$

(C) $\log_e\tan^{-1}x^3+\frac{1}{x^3}+C$

(D) $\log_e\tan^{-1}x^3+\frac{1}{x^3}^{3}+C$

Answer: (A) $\log\tan^{-1}x^3+\frac{1}{x^3}^{\frac{1}{3}}+C$ · Key from source paper

Q30 JEE Main 2023 · 15 Apr · Shift 1 · Numerical

Let $f(x)=\int \frac{dx}{(3+4x^2)\sqrt{4-3x^2}}$, $|x|<\frac{2}{\sqrt{3}}$. If $f(0)=0$ and $f(1)=\frac{1}{\alpha\beta}\tan^{-1}\left(\frac{\alpha}{\beta}\right)$, $\alpha,\beta>0$, then $\alpha^2+\beta^2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 28. · Key from source paper

Q31 JEE Main 2023 · 12 Apr · Shift 1 · Numerical

Let $I(x)=\int\sqrt{\frac{x+7}{x}}\,dx$ and $I(9)=12+7\log_e 7$. If $I(1)=\alpha+7\log_e\left(1+2\sqrt{2}\right)$, then α^4 is equal to _____.

Numerical value type: the answer is a number.

Answer: 64. · Key from source paper

Q32 JEE Main 2023 · 11 Apr · Shift 1 · MCQ

The value of the integral $\int_{-\log_e 2}^{\log_e 2} e^x\log_e e^x+\sqrt{1+e^{2x}}\,dx$ is equal to

(A) $\log_e\frac{\sqrt{2}\left(2+\sqrt{5}\right)^2}{\sqrt{1+\sqrt{5}}}-\frac{\sqrt{5}}{2}$

(B) $\log_e\frac{\left(2+\sqrt{5}\right)^2}{\sqrt{1+\sqrt{5}}}+\frac{\sqrt{5}}{2}$

(C) $\log_e\frac{2\left(2+\sqrt{5}\right)}{\sqrt{1+\sqrt{5}}}-\frac{\sqrt{5}}{2}$

(D) $\log_e\frac{\sqrt{2}\left(3-\sqrt{5}\right)^2}{\sqrt{1+\sqrt{5}}}+\frac{\sqrt{5}}{2}$

Answer: (A) $\log_e\frac{\sqrt{2}\left(2+\sqrt{5}\right)^2}{\sqrt{1+\sqrt{5}}}-\frac{\sqrt{5}}{2}$ · Key from source paper

Q33 JEE Main 2023 · 10 Apr · Shift 1 · MCQ

If $Ix=\int e^{\sin^2 x}\cos x\ \sin 2x-\sin x\,dx$ and $I0=1$, then $I\frac{\pi}{3}$ is equal to

(A) $-\frac{1}{2}e^{\frac{3}{4}}$

(B) $\frac{1}{2}e^{\frac{3}{4}}$

(C) $-e^{\frac{3}{4}}$

(D) $e^{\frac{3}{4}}$

Answer: (B) $\frac{1}{2}e^{\frac{3}{4}}$ · Key from source paper

Q34 JEE Main 2023 · 10 Apr · Shift 2 · MCQ

For $\alpha,\beta,\gamma,\delta\in\mathbb{N}$, if $\int\left(\frac{x^{2x}}{e}+\frac{e^{2x}}{x}\right)\log_e x\,dx=\frac{1}{\alpha}\frac{x^{\beta x}}{e}-\frac{1}{\gamma}\frac{e^{\delta x}}{x}+C$, where $e=\sum_{n=0}^{\infty}\frac{1}{n!}$ and C is constant of integration, then $\alpha+2\beta+3\gamma-4\delta$ is equal to

(A) 1
(B) 4
(C) -4
(D) -8

Answer: (B) 4 · Key from source paper

Q35 JEE Main 2023 · 8 Apr · Shift 1 MCQ

Let $I(x)=\int \frac{x+1}{x(1+xe^x)^2}dx$, $x>0$. If $\lim_{x\to\infty} I(x)=0$ then $I(1)$ is equal to

(A) $\frac{e+2}{e+1}-\log_e(e+1)$
(B) $\frac{e+1}{e+2}+\log_e(e+1)$
(C) $\frac{e+1}{e+2}-\log_e(e+1)$
(D) $\frac{e+2}{e+1}+\log_e(e+1)$

Answer: (A) $\frac{e+2}{e+1}-\log_e(e+1)$ · Key from source paper

Q36 JEE Main 2023 · 6 Apr · Shift 1 MCQ

Let $I(x)=\int \frac{x^2x\ \sec^2+\tan x}{(x\ \tan x+1)^2}dx$ If $I(0)=0$, then $I\left(\frac{\pi}{4}\right)$ is equal to

(A) $\log_e\frac{(\pi+4)^2}{16}+\frac{\pi^2}{4(\pi+4)}$
(B) $\log_e\frac{(\pi+4)^2}{16}-\frac{\pi^2}{4(\pi+4)}$
(C) $\log_e\frac{(\pi+4)^2}{32}-\frac{\pi^2}{4(\pi+4)}$
(D) $\log_e\frac{(\pi+4)^2}{32}+\frac{\pi^2}{4(\pi+4)}$

Answer: (C) $\log_e\frac{(\pi+4)^2}{32}-\frac{\pi^2}{4(\pi+4)}$ · Key from source paper

Q37 JEE Main 2023 · 30 Jan · Shift 2 Numerical

If $\int\sqrt{\sec\ 2x-1}dx=\alpha\ \log_e\left|\cos\ 2x+\beta+\sqrt{\cos\ 2x\left(1+\cos\frac{1}{\beta}x\right)}\right|$ + constant, then $\beta-\alpha$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q38 JEE Main 2023 · 25 Jan · Shift 1 MCQ

Let $f(x)=\int\frac{2x}{(x^2+1)(x^2+3)}dx$. If $f(3)=\frac{1}{2}(\log_e 5-\log_e 6)$, then $f(4)$ is equal to

(A) $\frac{1}{2}(\log_e 17 - \log_e 19)$
(B) $\log_e 17 - \log_e 18$
(C) $\frac{1}{2}(\log_e 19 - \log_e 17)$
(D) $\log_e 19 - \log_e 20$

Answer: (A) $\frac{1}{2}(\log_e 17 - \log_e 19)$ · Key from source paper

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Q39 JEE Main 2022 · 29 Jul · Shift 1 MCQ

The integral $\int_0^{\frac{\pi}{2}} \frac{1}{3+2\sin x+\cos x}dx$ is equal to:

(A) $\tan^{-1}(2)$
(B) $\tan^{-1}(2) - \frac{\pi}{4}$
(C) $\frac{1}{2}\tan^{-1}(2) - \frac{\pi}{8}$
(D) $\frac{1}{2}$

Answer: (B) $\tan^{-1}(2) - \frac{\pi}{4}$ · Key from source paper

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Q40 JEE Main 2022 · 29 Jul · Shift 2 MCQ

For $Ix = \int \frac{\sec^2 x - 2022}{\sin^{2022} x}dx$, if $I\frac{\pi}{4} = 2^{1011}$, then

(A) $3^{1010}I\frac{\pi}{3} - I\frac{\pi}{6} = 0$
(B) $3^{1010}I\frac{\pi}{6} - I\frac{\pi}{3} = 0$
(C) $3^{1011}I\frac{\pi}{3} - I\frac{\pi}{6} = 0$
(D) $3^{1011}I\frac{\pi}{6} - I\frac{\pi}{3} = 0$

Answer: (A) $3^{1010}I\frac{\pi}{3} - I\frac{\pi}{6} = 0$ · Key from source paper

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Q41 JEE Main 2022 · 26 Jul · Shift 2 MCQ

The integral $\int \frac{1-\frac{1}{\sqrt{3}}\cos x - \sin x}{1+\frac{2}{\sqrt{3}}\sin 2x}dx$ is equal to

(A) $\frac{1}{2}\log_e \frac{\tan\frac{x}{2}+\frac{\pi}{12}}{\frac{x}{2}+\frac{\pi}{6}} + C$
(B) $\log_e \frac{\tan\frac{x}{2}+\frac{\pi}{6}}{\frac{x}{2}+\frac{\pi}{3}} + C$
(C) $\frac{1}{2}\log_e \frac{\tan\frac{x}{2}+\frac{\pi}{6}}{\frac{x}{2}+\frac{\pi}{3}} + C$
(D) $\frac{1}{2}\log_e \frac{\tan\frac{x}{2}-\frac{\pi}{12}}{\tan\frac{x}{2}-\frac{\pi}{6}} + C$

Answer: (A) $\frac{1}{2}\log_e \frac{\tan\frac{x}{2}+\frac{\pi}{12}}{\frac{x}{2}+\frac{\pi}{6}} + C$ · Key from source paper

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Q42 JEE Main 2022 · 27 Jun · Shift 1 MCQ

$\int \frac{(x^2+1)e^x}{(x+1)^2}dx = f(x)e^x + C$, where C is a constant, then $\frac{d^3f}{dx^3}$ at $x = 1$ is equal to

(A) $\frac{3}{4}$
(B) $\frac{3}{8}$
(C) $-\frac{3}{2}$
(D) $\frac{7}{8}$

Answer: (A) $\frac{3}{4}$ · Key from source paper

Q43 JEE Main 2022 · 26 Jun · Shift 2 MCQ

If $\int \frac{1}{x}\sqrt{\frac{1-x}{1+x}}dx = g(x) + c, g(1) = 0$, then $g\left(\frac{1}{2}\right)$ is equal to

(A) $\log_e\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) + \frac{\pi}{3}$
(B) $\log_e\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right) + \frac{\pi}{3}$
(C) $\log_e\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right) - \frac{\pi}{3}$
(D) $\frac{1}{3}\log_e\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) - \frac{\pi}{6}$

Answer: (A) $\log_e\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) + \frac{\pi}{3}$ · Key from source paper

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Q44 JEE Main 2021 · 31 Aug · Shift 1 MCQ

The integral $\int \frac{1}{\sqrt[4]{(x-1)^3(x+2)^5}}\,dx$ is equal to : (where C is a constant of integration)

(A) $\frac{3}{4}\left(\frac{x+2}{x-1}\right)^{\frac{5}{4}} + C$
(B) $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{\frac{1}{4}} + C$
(C) $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{\frac{5}{4}} + C$
(D) $\frac{3}{4}\left(\frac{x+2}{x-1}\right)^{\frac{1}{4}} + C$

Answer: (B) $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{\frac{1}{4}} + C$ · Key from source paper

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Q45 JEE Main 2021 · 31 Aug · Shift 2 Numerical

If $\int \frac{\sin x}{\sin^3 x+\cos^3 x}\,dx = \alpha\log_e|1+\tan x| + \beta\log_e 1-\tan x+\tan^2 x + \gamma\tan^{-1}\frac{2\tan x-1}{\sqrt{3}} + C$, when C is constant of integration, then the value of $18\left(\alpha+\beta+\gamma^2\right)$ is

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q46 JEE Main 2021 · 27 Aug · Shift 1 Numerical

If $\int \frac{dx}{(x^2+x+1)^2} = a\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right) + b\left(\frac{2x+1}{x^2+x+1}\right) + C, x > 0$ where C is the constant of integration, then the value of $9\left(\sqrt{3}a+b\right)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 15. · Key from source paper

Q47 JEE Main 2021 · 27 Aug · Shift 2 · Numerical

$\int \frac{2e^x+3e^{-x}}{4e^x+7e^{-x}}dx = \frac{1}{14}(ux + v\log_e(4e^x+7e^{-x})) + C$, where C is a constant of integration, then $u+v$ is equal to

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q48 JEE Main 2021 · 20 Jul · Shift 2 · Numerical

For $k \in N$, let $\frac{1}{\alpha(\alpha+1)(\alpha+2).\ldots.(\alpha+20)} = \sum_{K=0}^{20} \frac{A_K}{\alpha+k}$, where $\alpha > 0$. Then the value of $100\left(\frac{A_{14}+A_{15}}{A_{13}}\right)^2$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 9. · Key from source paper

Q49 JEE Main 2021 · 18 Mar · Shift 1 · MCQ

The integral $\int \frac{(2x-1)\cos\sqrt{(2x-1)^2+5}}{\sqrt{4x^2-4x+6}}dx$ is equal to (where c is a constant of integration)

(A) $\frac{1}{2}\sin\sqrt{(2x-1)^2+5}+c$

(B) $\frac{1}{2}\cos\sqrt{(2x+1)^2+5}+c$

(C) $\frac{1}{2}\cos\sqrt{(2x-1)^2+5}+c$

(D) $\frac{1}{2}\sin\sqrt{(2x+1)^2+5}+c$

Answer: (A) $\frac{1}{2}\sin\sqrt{(2x-1)^2+5}+c$ · Key from source paper

Q50 JEE Main 2021 · 18 Mar · Shift 1 · Numerical

If $f(x) = \int \frac{5x^8+7x^6}{(x^2+1+2x^7)^2}dx$, $(x \geq 0)$, $f(0) = 0$ and $f(1) = \frac{1}{K}$, then the value of K is

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q51 JEE Main 2021 · 16 Mar · Shift 2 · Numerical

For real numbers α, β, γ and δ, if $\int \frac{(x^2-1)+\tan^{-1}\left(\frac{x^2+1}{x}\right)}{(x^4+3x^2+1)\tan^{-1}\left(\frac{x^2+1}{x}\right)}dx = \alpha\log_e\left(\tan^{-1}\left(\frac{x^2+1}{x}\right)\right) + \beta\tan^{-1}\left(\frac{\gamma(x^2-1)}{x}\right) + \delta\tan^{-1}\left(\frac{x^2+1}{x}\right) + C$ where C is an arbitrary constant, then the value of $10(\alpha+\beta\gamma+\delta)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q52 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The value of the integral $\int \frac{\sin\theta\cdot\sin 2\theta(\sin^6\theta+\sin^4\theta+\sin^2\theta)\sqrt{2\sin^4\theta+3\sin^2\theta+6}}{1-\cos 2\theta}d\theta$ is (where c is a constant of integration)

(A) $\frac{1}{18}\left[11-18\sin^2\theta+9\sin^4\theta-2\sin^6\theta\right]^{\frac{3}{2}}+c$

(B) $\frac{1}{18}\left[9-2\sin^6\theta-3\sin^4\theta-6\sin^2\theta\right]^{\frac{3}{2}}+c$

(C) $\frac{1}{18}\left[11-18\cos^2\theta+9\cos^4\theta-2\cos^6\theta\right]^{\frac{3}{2}}+c$

(D) $\frac{1}{18}\left[9-2\cos^6\theta-3\cos^4\theta-6\cos^2\theta\right]^{-\frac{3}{2}}+c$

Answer: (C) $\frac{1}{18}\left[11-18\cos^2\theta+9\cos^4\theta-2\cos^6\theta\right]^{\frac{3}{2}}+c$ · Key from source paper

Q53 JEE Main 2021 · 25 Feb · Shift 2 MCQ

The integral $\int \frac{e^{3\log_e 2x}+5e^{2\log_e 2x}}{e^{4\log_e x}+5e^{3\log_e x}-7e^{2\log_e x}}dx$, $x>0$, is equal to
(where c is a constant of integration)

(A) $\log_e|x^2+5x-7|+c$

(B) $4\log_e|x^2+5x-7|+c$

(C) $\frac{1}{4}\log_e|x^2+5x-7|+c$

(D) $\log_e\sqrt{x^2+5x-7}+c$

Answer: (B) $4\log_e|x^2+5x-7|+c$ · Key from source paper

Q54 JEE Main 2021 · 24 Feb · Shift 1 MCQ

If $\int \frac{\cos x-\sin x}{\sqrt{8-\sin 2x}}dx=a\sin^{-1}\frac{\sin x+\cos x}{b}+c$, where c is a constant of integration, then the ordered pair a, b is equal to:

(A) $1,-3$

(B) $3,1$

(C) $-1,3$

(D) $1,3$

Answer: (D) $1,3$ · Key from source paper

Q55 JEE Main 2020 · 6 Sep · Shift 2 MCQ

The integral $\int_1^2 e^x\cdot x^x\,(2+\log_e x)\,dx$ equals :

(A) $e(4e+1)$

(B) $4e^2-1$

(C) $e(4e-1)$

(D) $e(2e-1)$

Answer: (C) $e(4e-1)$ · Key from source paper

EdLoop JEE

Q56 JEE Main 2020 · 5 Sep · Shift 1 MCQ

If $\int \left(e^{2x}+2e^{x}-e^{-x}-1\right) e^{\left(e^{x}+e^{-x}\right)} dx = g\left(x\right) e^{\left(e^{x}+e^{-x}\right)} + c$, where c is a constant of integration, then $g(0)$ is

(A) e
(B) e^2
(C) 1
(D) 2

Answer: (D) 2 · Key from source paper

Q57 JEE Main 2020 · 5 Sep · Shift 2 MCQ

If $\int \frac{\cos\theta}{5+7\sin\theta-2\cos^2\theta} d\theta = A\log_e|B(\theta)| + C$, where C is a constant of integration, then $\frac{B(\theta)}{A}$ can be:

(A) $\frac{2\sin\theta+1}{\sin\theta+3}$
(B) $\frac{2\sin\theta+1}{5(\sin\theta+3)}$
(C) $\frac{5(\sin\theta+3)}{2\sin\theta+1}$
(D) $\frac{5(2\sin\theta+1)}{\sin\theta+3}$

Answer: (D) $\frac{5(2\sin\theta+1)}{\sin\theta+3}$ · Key from source paper

Q58 JEE Main 2020 · 4 Sep · Shift 1 MCQ

The integral $\int \left(\frac{x}{x\sin x+\cos x}\right)^2 dx$ is equal to, (where C is a constant of integration):

(A) $\tan x - \frac{x\sec x}{x\sin x+\cos x} + C$
(B) $\sec x + \frac{x\tan x}{x\sin x+\cos x} + C$
(C) $\sec x - \frac{x\tan x}{x\sin x+\cos x} + C$
(D) $\tan x + \frac{x\sec x}{x\sin x+\cos x} + C$

Answer: (A) $\tan x - \frac{x\sec x}{x\sin x+\cos x} + C$ · Key from source paper

Q59 JEE Main 2020 · 3 Sep · Shift 2 MCQ

If $\int \sin^{-1}\left(\frac{\sqrt{x}}{1+x}\right) dx = A(x)\tan^{-1}(\sqrt{x}) + B(x) + C$, where C is a constant of integration, then the ordered pair $(A(x),\ B(x))$ can be :

(A) $(x-1,\ \sqrt{x})$
(B) $(x-1,\ -\sqrt{x})$
(C) $(x+1,\ \sqrt{x})$
(D) $(x+1,\ -\sqrt{x})$

Answer: (D) $(x+1,\ -\sqrt{x})$ · Key from source paper

Q60 JEE Main 2020 · 9 Jan · Shift 1 MCQ

The integral $\int \frac{dx}{(x+4)^{\frac{8}{7}}(x-3)^{\frac{6}{7}}}$ is equal to: (where C is a constant of integration)

(A) $\left(\frac{x-3}{x+4}\right)^{\frac{1}{7}}+C$

(B) $\left(\frac{x-3}{x+4}\right)^{\frac{-1}{7}}+C$

(C) $\frac{1}{2}\left(\frac{x-3}{x+4}\right)^{\frac{3}{7}}+C$

(D) $-\frac{1}{13}\left(\frac{x-3}{x+4}\right)^{\frac{-13}{7}}+C$

Answer: (A) $\left(\frac{x-3}{x+4}\right)^{\frac{1}{7}}+C$ · Key from source paper

Q61 JEE Main 2020 · 9 Jan · Shift 2 MCQ

If $\int \frac{d\theta}{\cos^2\theta(\tan 2\theta+\sec 2\theta)} = \lambda\tan\theta + 2\log_e|f(\theta)| + C$ where C is a constant of integration, then the ordered pair $(\lambda, f(\theta))$ is equal to:

(A) $(1, 1-\tan\theta)$

(B) $(-1, 1-\tan\theta)$

(C) $(-1, 1+\tan\theta)$

(D) $(1, 1+\tan\theta)$

Answer: (C) $(-1, 1+\tan\theta)$ · Key from source paper

Q62 JEE Main 2020 · 8 Jan · Shift 1 MCQ

If $\int \frac{\cos x\,dx}{\sin^3 x(1+\sin^6 x)^{\frac{2}{3}}} = f(x)(1+\sin^6 x)^{\frac{1}{\lambda}} + c$, where c is a constant of integration, then $\lambda f\left(\frac{\pi}{3}\right)$ is equal to

(A) $-\frac{9}{8}$

(B) 2

(C) $\frac{9}{8}$

(D) -2

Answer: (D) -2 · Key from source paper

Q63 JEE Main 2019 · 12 Apr · Shift 1 MCQ

The integral $\int \frac{2x^3-1}{x^4+x}dx$, is equal to

(A) $\frac{1}{2}\log_e\frac{(x^3+1)^2}{|x^3|}+C$

(B) $\log_e\frac{|x^3+1|}{x^2}+C$

(C) $\log_e\frac{x^3+1}{x}+C$

(D) $\frac{1}{2}\log_e\frac{|x^3+1|}{x^2}+C$

Answer: (C) $\log_e\frac{x^3+1}{x}+C$ · Key from source paper

Q64 JEE Main 2019 · 12 Apr · Shift 2 MCQ

Let $\alpha \in \left(0, \frac{\pi}{2}\right)$, be constant.If the integral $\int \frac{\tan x+\tan \alpha}{\tan x-\tan \alpha} dx = A(x)\cos 2\alpha + B(x)\sin 2\alpha + C$, where C is a constant of integration, then the functions $A(x)$ and $B(x)$ are respectively

(A) $x-\alpha$ and $\log_e|\sin(x-\alpha)|$
(B) $x+\alpha$ and $\log_e|\cos(x-\alpha)|$
(C) $x+\alpha$ and $\log_e|\sin(x+\alpha)|$
(D) $x-\alpha$ and $\log_e|\cos(x-\alpha)|$

Answer: (A) $x-\alpha$ and $\log_e|\sin(x-\alpha)|$ · Key from source paper

Q65 JEE Main 2019 · 10 Apr · Shift 1 MCQ

If $\int \frac{dx}{(x^2-2x+10)^2} = A\left(\tan^{-1}\left(\frac{x-1}{3}\right) + \frac{f(x)}{x^2-2x+10}\right) + C$, then (where C is a constant of integration)

(A) $A = \frac{1}{27}$ and $f(x) = 9(x-1)$
(B) $A = \frac{1}{81}$ and $f(x) = 3(x-1)$
(C) $A = \frac{1}{54}$ and $f(x) = 9(x-1)^2$
(D) $A = \frac{1}{54}$ and $f(x) = 3(x-1)$

Answer: (D) $A = \frac{1}{54}$ and $f(x) = 3(x-1)$ · Key from source paper

Q66 JEE Main 2019 · 10 Apr · Shift 2 MCQ

If $\int x^5 e^{-x^2} dx = gxe^{-x^2} + c$, where c is a constant of integration, then g-1 is equal to

(A) $-\frac{5}{2}$
(B) -1
(C) 1
(D) $-\frac{1}{2}$

Answer: (A) $-\frac{5}{2}$ · Key from source paper

Q67 JEE Main 2019 · 9 Apr · Shift 1 MCQ

$\int \sec^2 x \cdot \cot^{\frac{4}{3}} x\, dx$ is equal to

(A) $3\tan^{-\frac{1}{3}} x + C$
(B) $-\frac{3}{4}\tan^{-\frac{4}{3}} x + C$
(C) $-3\tan^{-\frac{1}{3}} x + C$
(D) $-3\cot^{-\frac{1}{3}} x + C$

Answer: (C) $-3\tan^{-\frac{1}{3}} x + C$ · Key from source paper

Q68 JEE Main 2019 · 9 Apr · Shift 2 MCQ

If $\int e^{\sec x}\left(\sec x \tan x f(x)+\left(\sec x \tan x+\sec^2 x\right)\right) dx = e^{\sec x} f(x)+C$, then a possible choice of $f(x)$ is:

(A) $\sec x - \tan x - \frac{1}{2}$

(B) $\sec x + \tan x + \frac{1}{2}$

(C) $x \sec x + \tan x + \frac{1}{2}$

(D) $\sec x + x \tan x - \frac{1}{2}$

Answer: (B) $\sec x + \tan x + \frac{1}{2}$ · Key from source paper

Q69 JEE Main 2019 · 8 Apr · Shift 1 MCQ

$\int \frac{\sin \frac{5x}{2}}{\sin \frac{x}{2}} dx$, is equal to

(A) $x + 2\sin x + \sin 2x + c$

(B) $2x + \sin x + \sin 2x + c$

(C) $x + 2\sin x + 2\sin 2x + c$

(D) $2x + \sin x + 2\sin 2x + c$

Answer: (A) $x + 2\sin x + \sin 2x + c$ · Key from source paper

Q70 JEE Main 2019 · 8 Apr · Shift 2 MCQ

If $\int \frac{dx}{x^3(1+x^6)^{\frac{2}{3}}} = xf(x)(1+x^6)^{\frac{1}{3}} + C$, where C is a constant of integration, then the function fx is equal to

(A) $\frac{3}{x^2}$

(B) $-\frac{1}{2x^3}$

(C) $-\frac{1}{6x^3}$

(D) $-\frac{1}{2x^2}$

Answer: (B) $-\frac{1}{2x^3}$ · Key from source paper

Q71 JEE Main 2019 · 12 Jan · Shift 1 MCQ

The integral $\int \cos(\ln x) dx$, is equal to

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(A) $\frac{x}{2}(\cos(\ln x) - \sin(\ln x)) + C$
(B) $x(\cos(\ln x) - \sin(\ln x)) + C$
(C) $x(\cos(\ln x) + \sin(\ln x)) + C$
(D) $\frac{x}{2}(\cos(\ln x) + \sin(\ln x)) + C$

Answer: (D) $\frac{x}{2}(\cos(\ln x) + \sin(\ln x)) + C$ · Key from source paper

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Q72 JEE Main 2019 · 12 Jan · Shift 2 MCQ

The integral $\int \frac{3x^{13} + 2x^{11}}{(2x^4 + 3x^2 + 1)^4} dx$, is equal to

(A) $\frac{x^4}{6(2x^4 + 3x^2 + 1)^3} + C$
(B) $\frac{x^4}{(2x^4 + 3x^2 + 1)^3} + C$
(C) $\frac{x^{12}}{(2x^4 + 3x^2 + 1)^3} + C$
(D) $\frac{x^{12}}{6(2x^4 + 3x^2 + 1)^3} + C$

Answer: (D) $\frac{x^{12}}{6(2x^4 + 3x^2 + 1)^3} + C$ · Key from source paper

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Q73 JEE Main 2019 · 11 Jan · Shift 1 MCQ

If $\int \frac{\sqrt{1-x^2}}{x^4} dx = A(x)\left(\sqrt{1-x^2}\right)^m + C$, for a suitable chosen integer m and a function A(x), where C is a constant of integration, then $(A(x))^m$ equals :

(A) $\frac{-1}{27x^9}$
(B) $\frac{-1}{3x^3}$
(C) $\frac{1}{27x^6}$
(D) $\frac{1}{9x^4}$

Answer: (A) $\frac{-1}{27x^9}$ · Key from source paper

Q74 JEE Main 2019 · 11 Jan · Shift 2 MCQ

If $\int \frac{x+1}{\sqrt{2x-1}}$ dx = $f(x)\sqrt{2x-1}$ + C, where C is a constant of integration, then $f(x)$ is equal to:

(A) $\frac{1}{3}(x + 1)$
(B) $\frac{2}{3}(x + 2)$
(C) $\frac{2}{3}(x - 4)$
(D) $\frac{1}{3}(x + 4)$

Answer: (D) $\frac{1}{3}(x + 4)$ · Key from source paper

Q75 JEE Main 2019 · 10 Jan · Shift 1 MCQ

Let, $n \geq 2$ be a natural number and $0 < \theta < \frac{\pi}{2}$. Then $\int \frac{(\sin^n\theta - \sin\theta)^{\frac{1}{n}} \cos\theta}{\sin^{n+1}\theta} d\theta$, is equal to

(A) $\frac{n}{n^2-1}\left(1-\frac{1}{\sin^{n+1}\theta}\right)^{\frac{n+1}{n}} + c$

(B) $\frac{n}{n^2+1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}} + c$

(C) $\frac{n}{n^2-1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}} + c$

(D) $\frac{n}{n^2-1}\left(1+\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}} + c$

Answer: (C) $\frac{n}{n^2-1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}} + c$ · Key from source paper

Q76 JEE Main 2019 · 10 Jan · Shift 2 MCQ

If $\int x^5 e^{-4x^3} dx = \frac{1}{48} e^{-4x^3} f(x) + C$, where C is a constant of integration, then $f(x)$ is equal to

(A) $-4x^3 - 1$

(B) $-2x^3 + 1$

(C) $-2x^3 - 1$

(D) $4x^3 + 1$

Answer: (A) $-4x^3 - 1$ · Key from source paper

Q77 JEE Main 2019 · 9 Jan · Shift 2 MCQ

If $f(x) = \int \frac{(5x^8 + 7x^6)}{(x^2 + 1 + 2x^7)^2} dx$, $(x \geq 0)$, and $f(0) = 0$, then the value of $f(1)$ is

(A) $\frac{-1}{4}$

(B) $\frac{1}{2}$

(C) $\frac{1}{4}$

(D) $-\frac{1}{2}$

Answer: (C) $\frac{1}{4}$ · Key from source paper

Q78 JEE Main 2018 · 16 Apr · Online MCQ

If $\int \frac{\tan x}{1+\tan x+\tan^2 x} dx = x - \frac{K}{\sqrt{A}} \tan^{-1}\left(\frac{K\tan x + 1}{\sqrt{A}}\right) + C$, ($C$ is a constant of integration), then the ordered pair (K, A) is equal to

(A) $(2, 1)$
(B) $(2, 3)$
(C) $(-2, 1)$
(D) $(-2, 3)$

Answer: (B) $(2, 3)$ · Key from source paper

Q79 JEE Main 2018 · 15 Apr · Shift 1 MCQ

If $f\left(\frac{x-4}{x+2}\right) = 2x + 1$, $(x \in R - \{1, -2\})$, then $\int f(x)\,dx$ is equal to (where C is a constant of integration)

(A) $12\log_e|1-x| - 3x + c$
(B) $-12\log_e|1-x| - 3x + c$
(C) $-12\log_e|1-x| + 3x + c$
(D) $12\log_e|1-x| + 3x + c$

Answer: (B) $-12\log_e|1-x| - 3x + c$ · Key from source paper

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Q80 JEE Main 2018 · 15 Apr · Shift 2 MCQ

$$\int \frac{2x+5}{\sqrt{7-6x-x^2}}dx = A\sqrt{7-6x-x^2} + B\sin^{-1}\left(\frac{x+3}{4}\right) + C$$

(where C is a constant of integration), then the ordered pair (A, B) is equal to

(A) $(-2, -1)$
(B) $(2, -1)$
(C) $(-2, 1)$
(D) $(2, 1)$

Answer: (A) $(-2, -1)$ · Key from source paper

Q81 JEE Main 2018 · 8 Apr · Offline MCQ

The integral $\int \frac{\sin^2 x\cos^2 x}{\left(\sin^5 x + \cos^3 x\sin^2 x + \sin^3 x\cos^2 x + \cos^5 x\right)^2}\,dx$, is equal to

(where C is the constant of integration).

(A) $\frac{-1}{1+\cot^3 x} + C$
(B) $\frac{1}{3(1+\tan^3 x)} + C$
(C) $\frac{-1}{3(1+\tan^3 x)} + C$
(D) $\frac{1}{1+\cot^3 x} + C$

Answer: (C) $\frac{-1}{3(1+\tan^3 x)} + C$ · Key from source paper

Q82 JEE Main 2017 · 9 Apr · Online · MCQ

If $\int_1^2 \frac{dx}{(x^2-2x+4)^{\frac{3}{2}}} = \frac{k}{k+5}$, then k is equal to

(A) 4
(B) 2
(C) 3
(D) 1

Answer: (D) 1 · Key from source paper

Q83 JEE Main 2017 · 8 Apr · Online · MCQ

The integral $\int \sqrt{1+2\cot x(\operatorname{cosec} x+\cot x)}\,dx$, $\left(0<x<\frac{\pi}{2}\right)$ is equal to

(A) $2\log\left|\sin\frac{x}{2}\right|+c$
(B) $4\log\left|\sin\frac{x}{2}\right|+c$
(C) $4\log\left|\cos\frac{x}{2}\right|+c$
(D) $2\log\left|\cos\frac{x}{2}\right|+c$

Answer: (A) $2\log\left|\sin\frac{x}{2}\right|+c$ · Key from source paper

Q84 JEE Main 2017 · 2 Apr · Offline · MCQ

Let, $I_n=\int \tan^n x\,dx\ (n>1)$. If $I_4+I_6=a\tan^5 x+bx^5+c$, then the ordered pair (a,b), is equal to

(A) $\left(-\frac{1}{5},\ 1\right)$
(B) $\left(\frac{1}{5},\ 0\right)$
(C) $\left(\frac{1}{5},\ -1\right)$
(D) $\left(-\frac{1}{5},\ 0\right)$

Answer: (B) $\left(\frac{1}{5},\ 0\right)$ · Key from source paper

Q85 JEE Main 2016 · 10 Apr · Online · MCQ

The integral $\int \frac{dx}{(1+\sqrt{x})\sqrt{x-x^2}}$ is equal to

(A) $-2\sqrt{\frac{1+\sqrt{x}}{1-\sqrt{x}}}+c$
(B) $-\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}+c$
(C) $-2\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}+c$
(D) $\sqrt{\frac{1+\sqrt{x}}{1-\sqrt{x}}}+c$

Answer: (C) $-2\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}+c$ · Key from source paper

Q86 JEE Main 2016 · 9 Apr · Online MCQ

If $\int \frac{dx}{\cos^3 x\sqrt{2\sin 2x}} = (\tan x)^A + C(\tan x)^B + k$, where k is a constant of integration, then $A + B + C$ equals

(A) $\frac{16}{5}$
(B) $\frac{27}{10}$
(C) $\frac{7}{10}$
(D) $\frac{21}{5}$

Answer: (A) $\frac{16}{5}$ · Key from source paper

Q87 JEE Main 2016 · 3 Apr · Offline MCQ

The integral $\int \frac{2x^{12}+5x^9}{(x^5+x^3+1)^3}\,dx$, is equal to

(A) $\frac{x^5}{2(x^5+x^3+1)^2} + c$
(B) $\frac{-x^{10}}{2(x^5+x^3+1)^2} + c$
(C) $\frac{-x^5}{(x^5+x^3+1)^2} + c$
(D) $\frac{x^{10}}{2(x^5+x^3+1)^2} + c$

Answer: (D) $\frac{x^{10}}{2(x^5+x^3+1)^2} + c$ · Key from source paper

Q88 JEE Main 2015 · 11 Apr · Online MCQ

If $\int \frac{\log\left(t+\sqrt{1+t^2}\right)}{\sqrt{1+t^2}}\,dt = \frac{1}{2}(g(t))^2 + c$, where c is a constant, then $g(2)$, is equal to

(A) $\frac{1}{\sqrt{5}}\log\left(2+\sqrt{5}\right)$
(B) $2\log\left(2+\sqrt{5}\right)$
(C) $\log\left(2+\sqrt{5}\right)$
(D) $\frac{1}{2}\log\left(2+\sqrt{5}\right)$

Answer: (C) $\log\left(2+\sqrt{5}\right)$ · Key from source paper

Q89 JEE Main 2015 · 10 Apr · Online MCQ

The integral $\int \frac{dx}{(x+1)^{\frac{3}{4}}(x-2)^{\frac{5}{4}}}$, is equal to

(A) $4\left(\frac{x-2}{x+1}\right)^{\frac{1}{4}} + c$
(B) $-\frac{4}{3}\left(\frac{x+1}{x-2}\right)^{\frac{1}{4}} + c$
(C) $4\left(\frac{x+1}{x-2}\right)^{\frac{1}{4}} + c$
(D) $-\frac{4}{3}\left(\frac{x-2}{x+1}\right)^{\frac{1}{4}} + c$

Answer: (B) $-\frac{4}{3}\left(\frac{x+1}{x-2}\right)^{\frac{1}{4}} + c$ · Key from source paper

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Q90 JEE Main 2015 · 4 Apr · Offline MCQ

The integral $\int \frac{dx}{x^2\left(x^4+1\right)^{\frac{3}{4}}}$ equals to

(A) $-\left(\frac{x^4+1}{x^4}\right)^{\frac{1}{4}}+c$

(B) $\left(\frac{x^4+1}{x^4}\right)^{\frac{1}{4}}+c$

(C) $\left(x^4+1\right)^{\frac{1}{4}}+c$

(D) $-\left(x^4+1\right)^{\frac{1}{4}}+c$

Answer: (A) $-\left(\frac{x^4+1}{x^4}\right)^{\frac{1}{4}}+c$ · Key from source paper

Q91 JEE Main 2014 · 19 Apr · Online MCQ

If m is a non-zero number and $\int \frac{x^{5m-1}+2x^{4m-1}}{(x^{2m}+x^m+1)^3}dx = f(x)+c$, then $f(x)$ is equal to

(A) $\frac{(x^{5m}-x^{4m})}{2m(x^{2m}+x^m+1)^2}$

(B) $\frac{1}{2m}\frac{x^{4m}}{(x^{2m}+x^m+1)^2}$

(C) $\frac{x^{5m}}{2m(x^{2m}+x^m+1)^2}$

(D) $\frac{2m(x^{5m}+x^{4m})}{(x^{2m}+x^m+1)^2}$

Answer: (B) $\frac{1}{2m}\frac{x^{4m}}{(x^{2m}+x^m+1)^2}$ · Key from source paper

Q92 JEE Main 2014 · 12 Apr · Online MCQ

The integral $\int \frac{\sin^2 x\cos^2 x}{(\sin^3 x+\cos^3 x)^2}dx$ is equal to:

(A) $\frac{1}{(1+\cot^3 x}+c$

(B) $-\frac{1}{3(1+\tan^3 x}+c)$

(C) $\frac{\sin^3 x}{(1+\cos^3 x}+c$

(D) $-\frac{\cos^3 x}{3(1+\sin^3 x}+c$

Answer: (B) $-\frac{1}{3(1+\tan^3 x}+c)$ · Key from source paper

Q93 JEE Main 2014 · 11 Apr · Online MCQ

The integral $\int x\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)dx\ (x>0)$ is equal to:

(A) $-x+(1+x^2)\tan^{-1}x+c$

(B) $x-(1+x^2)\cot^{-1}x+c$

(C) $-x+(1+x^2)\cot^{-1}x+c$

(D) $x-(1+x^2)\tan^{-1}x+c$

Answer: (A) $-x+(1+x^2)\tan^{-1}x+c$ · Key from source paper

Q94 JEE Main 2014 · 9 Apr · Online MCQ

$\int \frac{\sin^8 x-\cos^8 x}{(1-2\sin^2 x\cos^2 x)}dx$ is equal to

(A) $-\frac{1}{2}\sin 2x+c$

(B) $-\sin^2 x+c$

(C) $-\frac{1}{2}\sin x+c$

(D) $\frac{1}{2}\sin 2x+c$

Answer: (A) $-\frac{1}{2}\sin 2x+c$ · Key from source paper

Q95 JEE Main 2014 · 6 Apr · Offline MCQ

The integral $\int\left(1+x-\frac{1}{x}\right)e^{x+\frac{1}{x}}dx$, is equal to

(A) $(x+1)e^{x+\frac{1}{x}}+c$

(B) $-xe^{x+\frac{1}{x}}+c$

(C) $(x-1)e^{x+\frac{1}{x}}+c$

(D) $xe^{x+\frac{1}{x}}+c$

Answer: (D) $xe^{x+\frac{1}{x}}+c$ · Key from source paper

Q96 JEE Main 2013 · 25 Apr · Online MCQ

If the integral $\int\frac{\cos 8x+1}{\cot 2x-\tan 2x}dx=A\cos 8x+k$ where k is an arbitrary constant, then A is equal to:

(A) $-\frac{1}{16}$

(B) $\frac{1}{16}$

(C) $\frac{1}{8}$

(D) $-\frac{1}{8}$

Answer: (A) $-\frac{1}{16}$ · Key from source paper

Q97 JEE Main 2013 · 23 Apr · Online MCQ

The integral $\int\frac{x\,dx}{2-x^2+\sqrt{2-x^2}}$ equals :

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(A) $\log\left|1+\sqrt{2+x^2}\right|+c$

(B) $-\log\left|1+\sqrt{2-x^2}\right|+c$

(C) $-x\log\left|1-\sqrt{2-x^2}\right|+c$

(D) $x\log\left|1-\sqrt{2+x^2}\right|+c$

Answer: (B) $-\log\left|1+\sqrt{2-x^2}\right|+c$ · Key from source paper

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Q98 JEE Main 2013 · 22 Apr · Online MCQ

If $\int \frac{x^2-x+1}{x^2+1}e^{\cot^{-1}x}dx = A(x)e^{\cot^{-1}x}+C$, then $A(x)$ is equal to :

(A) $-x$

(B) x

(C) $\sqrt{1-x}$

(D) $\sqrt{1+x}$

Answer: (B) x · Key from source paper

Q99 JEE Main 2013 · 9 Apr · Online MCQ

If $\int \frac{dx}{x+x^7} = p(x)$ then, $\int \frac{x^6}{x+x^7}dx$ is equal to:

(A) $\ln|x| - p(x) + c$

(B) $\ln|x| + p(x) + c$

(C) $x - p(x) + c$

(D) $x + p(x) + c$

Answer: (A) $\ln|x| - p(x) + c$ · Key from source paper

Q100 JEE Main 2013 · 7 Apr · Offline MCQ

If $\int f(x)dx = \psi(x)$, then $\int x^5 f\left(x^3\right)dx$, is equal to

(A) $\frac{1}{3}x^3\psi\left(x^3\right) - \int x^2\psi\left(x^3\right)dx + c$

(B) $\frac{1}{3}\left[x^3\psi\left(x^3\right) - \int x^3\psi\left(x^3\right)dx\right] + c$

(C) $\frac{1}{3}\left[x^3\psi\left(x^3\right) - \int x^2\psi\left(x^3\right)dx\right] + c$

(D) $\frac{1}{3}x^3\psi\left(x^3\right) - 3\int x^3\psi\left(x^3\right)dx + c$

Answer: (A) $\frac{1}{3}x^3\psi\left(x^3\right) - \int x^2\psi\left(x^3\right)dx + c$ · Key from source paper

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Q101 AIEEE 2012 · 26 May · Online MCQ

$f(x) = \int \frac{dx}{\sin^6 x}$ is a polynomial of degree

(A) 5 in $\cot x$
(B) 5 in $\tan x$
(C) 3 in $\tan x$
(D) 3 in $\cot x$

Answer: (A) 5 in $\cot x$ · Key from source paper

Q102 AIEEE 2012 · 19 May · Online MCQ

If $f(x) = \int \left(\frac{x^2+\sin^2 x}{1+x^2}\right) \sec^2 x \, dx$ and $f(0) = 0$, then $f(1)$ equals

(A) $\tan 1 - \frac{\pi}{4}$
(B) $\tan 1 + 1$
(C) $\frac{\pi}{4}$
(D) $1 - \frac{\pi}{4}$

Answer: (A) $\tan 1 - \frac{\pi}{4}$ · Key from source paper

Q103 AIEEE 2012 · 12 May · Online MCQ

The integral of $\dfrac{x^2 - x}{x^3 - x^2 + x - 1}$ w.r.t. x is

(A) $\frac{1}{2}\log\left(x^2 + 1 + c\right)$
(B) $\frac{1}{2}\log|x^2 - 1| + c$
(C) $\log\left(x^2 + 1 + c\right)$
(D) $\log|x^2 - 1| + c$

Answer: (A) $\frac{1}{2}\log\left(x^2 + 1 + c\right)$ · Key from source paper

Q104 AIEEE 2012 · 7 May · Online MCQ

Let $f(x)$ be an indefinite integral of $\cos^3 x$. Statement 1: $f(x)$ is a periodic function of period π. Statement 2: $\cos^3 x$ is a periodic function.

(A) Statement 1 is true, Statement 2 is false.
(B) Both the Statements are true, but Statement 2 is not the correct explanation of Statement 1.
(C) Both the Statements are true, and Statement 2 is correct explanation of Statement 1.
(D) Statement 1 is false, Statement 2 is true.

Answer: (D) Statement 1 is false, Statement 2 is true. · Key from source paper

Q105 AIEEE 2012 · Offline MCQ

If the integral $\int \frac{5\tan x}{\tan x - 2} dx = x + a\ln|\sin x - 2\cos x| + k$, then a is equal to

(A) -1
(B) -2
(C) 1
(D) 2

Answer: (D) 2 · Key from source paper

Q106 AIEEE 2008 MCQ

The value of $\sqrt{2}\int \frac{\sin x\,dx}{\sin\left(x-\frac{\pi}{4}\right)}$ is

(A) $x+\log\left|\cos\left(x-\frac{\pi}{4}\right)\right|+c$
(B) $x-\log\left|\sin\left(x-\frac{\pi}{4}\right)\right|+c$
(C) $x+\log\left|\sin\left(x-\frac{\pi}{4}\right)\right|+c$
(D) $x-\log\left|\cos\left(x-\frac{\pi}{4}\right)\right|+c$

Answer: (C) $x+\log\left|\sin\left(x-\frac{\pi}{4}\right)\right|+c$ · Key from source paper

Q107 AIEEE 2007 MCQ

$\int \frac{dx}{\cos x+\sqrt{3}\sin x}$ equals

(A) $\frac{1}{2}\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+c$
(B) $\frac{1}{2}\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)+c$
(C) $\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+c$
(D) $\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)+c$

Answer: (A) $\frac{1}{2}\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+c$ · Key from source paper

Q108 AIEEE 2005 MCQ

$\int\left\{\frac{(\log x-1)}{(1+(\log x)^2)}\right\}^2 dx$ is equal to

(A) $\frac{\log x}{(\log x)^2+1}+C$
(B) $\frac{x}{x^2+1}+C$
(C) $\frac{xe^x}{1+x^2}+C$
(D) $\frac{x}{(\log x)^2+1}+C$

Answer: (D) $\frac{x}{(\log x)^2+1}+C$ · Key from source paper

Q109 AIEEE 2004 MCQ

If $\int \frac{\sin x}{\sin(x-\alpha)}dx = Ax+B\log\sin(x-\alpha)+C$, then value of (A,B) is

(A) $(\sin\alpha, \cos\alpha)$

(B) $(\cos\alpha, \sin\alpha)$

(C) $(-\sin\alpha, \cos\alpha)$

(D) $(-\cos\alpha, \sin\alpha)$

Answer: (B) $(\cos\alpha, \sin\alpha)$ · Key from source paper

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Q110 AIEEE 2004 MCQ

$\int \frac{dx}{\cos x - \sin x}$ is equal to

(A) $\frac{1}{\sqrt{2}} \log \left|\tan\left(\frac{x}{2} - \frac{\pi}{8}\right)\right| + C$

(B) $\frac{1}{\sqrt{2}} \log \left|\cot\left(\frac{x}{2}\right)\right| + C$

(C) $\frac{1}{\sqrt{2}} \log \left|\tan\left(\frac{x}{2} - \frac{3\pi}{8}\right)\right| + C$

(D) $\frac{1}{\sqrt{2}} \log \left|\tan\left(\frac{x}{2} + \frac{3\pi}{8}\right)\right| + C$

Answer: (D) $\frac{1}{\sqrt{2}} \log \left|\tan\left(\frac{x}{2} + \frac{3\pi}{8}\right)\right| + C$ · Key from source paper

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