EdLoop

EdLoop JEE

MATHEMATICS · JEE MAIN

Definite Integration

Previous Year Questions with answers

311 questions · **189** papers · **2002–2026** · newest paper first

Step-by-step solutions for every question: free in the EdLoop JEE app (Google Play) · pyq.edloop.in

What is in this PDF: every Definite 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.

Step-by-step solutions for every question are free in the EdLoop JEE app (Google Play) and on app.edloop.in. More chapters: pyq.edloop.in/free-pdfs/

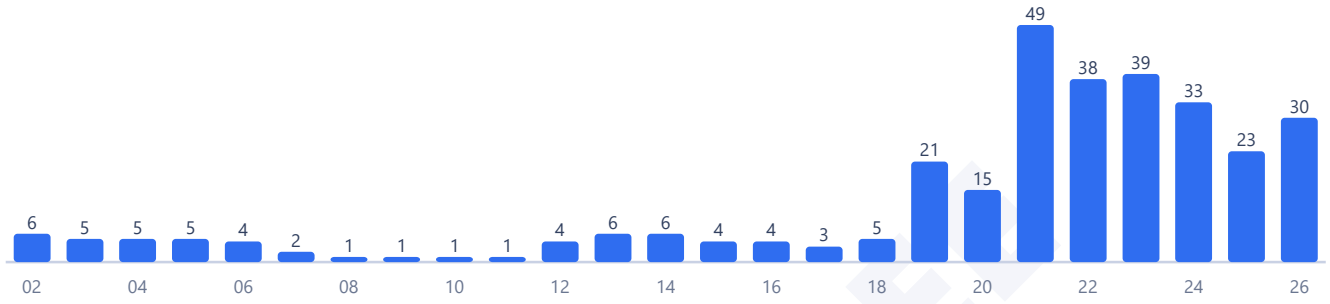
EdLoop

Chapter at a glance

5.4%	311	153 of 162	238 / 73
of Mathematics questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Steady: 1.5 questions per paper in 2024–2026 against 1.6 in 2019–2023.

Questions per year



Counts are the questions we hold: 311 in 189 papers. 2 questions in this chapter came back in more than one paper.

Most-asked topics in this chapter (2002–2026)



How often it comes up

Definite Integration is one of the chapters JEE Main Mathematics returns to most often. In the papers we hold from 2019 to 2026 it gave **248 questions in 162 papers**, about **1.5 questions per paper**, and it appeared in 153 of those papers. By share of Mathematics questions (5.4%) it ranks **5th of 29 Mathematics chapters** in that period.

It has grown since the AIEEE years. From 2002 to 2018 it was 4.8% of Mathematics; in the last three exam years (2024 to 2026) it is 5.6%, with 86 questions in 58 papers. The busiest year was 2021, with 49 questions across the 26 papers we hold. Since 2019 there has been no year without it.

It is a Class 12 chapter, part of NTA's Unit 8: Integral Calculus, and it sits on top of Indefinite Integration: if your antiderivatives are slow, these questions will be slow too.

Most-asked topics

Almost all the questions fall under three topics. From 2019 to 2026:

- **Evaluation & Properties**: 198 questions. Most of the chapter: evaluating an integral directly or, more often, using a property to avoid the long route.
- **Special Definite Integrals**: 30 questions. Integral equations, functions defined by an integral, and integrals that hide a known result.
- **Limit as a Sum & Estimation**: 20 questions. Turning a limit of a sum into an integral, or bounding an integral.

All three topics were asked again in 2026.

What the questions look like

The typical question gives an integral that looks heavy and rewards the student who spots the trick: an odd function over a symmetric interval, the property that replaces x with a + b − x, a modulus that splits the interval, or the

greatest integer or fractional part function that turns the integral into a sum of simple pieces.

A second kind defines a function through an integral and asks for its value somewhere. These need you to differentiate both sides (the fundamental theorem of calculus) and solve the small equation that results.

The third kind starts as a limit of a sum, and the work is in recognising the Riemann sum and writing the right integral.

A large share is numerical-answer: 73 of the 248 questions since 2019 had no options, so the final value has to be exact.

How to practise it

Make a short list of the standard properties and test yourself on when each one applies; most marks in this chapter come from choosing the right property in the first minute. Then practise integrals with the modulus, greatest integer and fractional part functions until splitting the interval is automatic.

After that, do the integral-equation questions together with Differential Equations practice, since the method overlaps. Keep limit-as-a-sum questions for a separate short set: there are fewer of them, but they are quick marks once the pattern is familiar.

The full list below goes year by year, so you can also work through one recent year at a time as a timed set.

EdLoop JEE

Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

The value of the integral $\int_0^2 \frac{\sqrt{x(x^2+x+1)}}{\left(\sqrt{x}+1\right)\left(\sqrt{x^4+x^2+1}\right)}\,dx$ is equal to :

(A) $\frac{1}{3}\log_e\left(3-2\sqrt{2}\right)$

(B) $\frac{2}{3}\log_e\left(4+\sqrt{2}\right)$

(C) $\frac{2}{3}\log_e\left(3+2\sqrt{2}\right)$

(D) $\frac{1}{3}\log_e\left(1+6\sqrt{2}\right)$

Answer: (C) $\frac{2}{3}\log_e\left(3+2\sqrt{2}\right)$ · Official NTA final key

Q2 JEE Main 2026 · 8 Apr · Shift 2 Numerical

If $\int_{\pi/6}^{\pi/4}\left(\cot\left(x-\frac{\pi}{3}\right)\cot\left(x+\frac{\pi}{3}\right)+1\right)dx=\alpha\log_e\left(\sqrt{3}-1\right)$, then $9\alpha^2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 12. · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 1 MCQ

The value of the integral $\int_{-\pi/4}^{\pi/4}\left(\frac{32\cos^4 x}{1+e^{\sin x}}\right)dx$ is:

(A) $4\pi+2$

(B) $3\pi+8$

(C) $3\pi+4$

(D) $4\pi+3$

Answer: (B) $3\pi+8$ · Official NTA final key

Q4 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Let $f:\mathbf{R}\to\mathbf{R}$ be such that $f(xy)=f(x)f(y)$, for all $x,y\in\mathbf{R}$ and $f(0)\neq 0$. Let $g:[1,\infty)\to\mathbf{R}$ be a differentiable function such that

$x^2g(x)=\int_1^x\left(t^2f(t)-t\,g(t)\right)dt.$

Then $g(2)$ is equal to :

(A) $\frac{13}{8}$
(B) $\frac{11}{16}$
(C) $\frac{15}{32}$
(D) $\frac{17}{64}$

Answer: (C) $\frac{15}{32}$ · Official NTA final key

Q5 JEE Main 2026 · 6 Apr · Shift 2 MCQ

The value of the integral $\int_{-1}^{1}\left(\frac{x^3+|x|+1}{x^2+2|x|+1}\right)dx$ is equal to :

(A) $3\log_e 2$
(B) $2\log_e 2$
(C) $5\log_e 3$
(D) $3\log_e 3$

Answer: (B) $2\log_e 2$ · Official NTA final key

Q6 JEE Main 2026 · 5 Apr · Shift 1 MCQ

The value of the integral $\int_0^{\infty}\frac{\log_e(x)}{x^2+4}dx$ is:

(A) $\frac{\pi\log_e(2)}{2}$
(B) $\frac{\pi\log_e(2)}{4}$
(C) $1+\pi\log_e(2)$
(D) $2+\pi\log_e(2)$

Answer: (B) $\frac{\pi\log_e(2)}{4}$ · Official NTA final key

---

Q7 JEE Main 2026 · 5 Apr · Shift 1 MCQ

The value of the integral $\int_{\pi/6}^{\pi/3}\left(\frac{4-\operatorname{cosec}^2 x}{\cos^4 x}\right)dx$ is:

(A) $\frac{11}{\sqrt{3}}$
(B) $\frac{16}{\sqrt{3}}$
(C) $\frac{32}{3\sqrt{3}}$
(D) $\frac{64}{3\sqrt{3}}$

Answer: (C) $\frac{32}{3\sqrt{3}}$ · Official NTA final key

Q8 JEE Main 2026 · 5 Apr · Shift 2 MCQ

Let $(2^{1-a}+2^{1+a})$, $f(a)$, (3^a+3^{-a}) be in A.P. and α be the minimum value of $f(a)$. Then the value of the integral $\int_{\log_e(\alpha-1)}^{\log_e(\alpha)} \frac{dx}{(e^{2x}-e^{-2x})}$ is :

(A) $\frac{1}{2}\log_e\left(\frac{4}{3}\right)$
(B) $\frac{1}{4}\log_e\left(\frac{4}{3}\right)$
(C) $\frac{1}{2}\log_e\left(\frac{8}{5}\right)$
(D) $\frac{1}{4}\log_e\left(\frac{8}{5}\right)$

Answer: (B) $\frac{1}{4}\log_e\left(\frac{4}{3}\right)$ · Official NTA final key

Q9 JEE Main 2026 · 5 Apr · Shift 2 MCQ

Let $f:[1,\infty)\to\mathbf{R}$ be a differentiable function defined as $f(x)=\int_1^x f(t)dt+(1-x)(\log_e x-1)+\mathrm{e}$. Then the value of $f(f(1))$ is :

(A) $(1+\mathrm{e}^{\mathrm{e}})$
(B) $(1+\mathrm{e})$
(C) $(1+\mathrm{e}+\mathrm{e}^{\mathrm{e}})$
(D) $1+2\mathrm{e}$

Answer: (A) $(1+\mathrm{e}^{\mathrm{e}})$ · Official NTA final key

Q10 JEE Main 2026 · 4 Apr · Shift 1 MCQ

Let $\int_{-2}^{2}(|\sin x|+[x\sin x])\,dx=2(3-\cos 2)+\beta$, where $[\cdot]$ is the greatest integer function. Then $\beta\sin\left(\frac{\beta}{2}\right)$ equals:

(A) 1
(B) 2
(C) 4
(D) 8

Answer: (B) 2 · Official NTA final key

Q11 JEE Main 2026 · 4 Apr · Shift 2 Numerical

Let f be a twice differentiable function such that $f(x)=\int_0^x\tan(t-x)\,dt-\int_0^x f(t)\tan t\,dt$, $x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$.

Then $f''\left(\frac{\pi}{6}\right)+12\,f'\left(-\frac{\pi}{6}\right)+f\left(\frac{\pi}{6}\right)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 5. · Official NTA final key

Q12 JEE Main 2026 · 2 Apr · Shift 1 MCQ

Let $[\cdot]$ denote the greatest integer function. Then the value of $\int_0^3 \left(\frac{e^x+e^{-x}}{[x]!}\right) dx$ is :

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

Answer: (B) $\frac{1}{2}\left(e^2+e^3-\frac{1}{e^2}-\frac{1}{e^3}\right)$ · Official NTA final key

Q13 JEE Main 2026 · 2 Apr · Shift 1 Numerical

If $\alpha=\int_0^{2\sqrt{3}} \log_2\left(x^2+4\right) dx+\int_2^4 \sqrt{2^x-4}\, dx$, then α^2 is equal to _____.

Numerical value type: the answer is a number.

Answer: 192. · Official NTA final key

Q14 JEE Main 2026 · 2 Apr · Shift 2 MCQ

The value of $\int_0^{20\pi}\left(\sin^4 x+\cos^4 x\right) dx$ is equal to :

(A) $\frac{15\pi}{2}$
(B) 25π
(C) 15π
(D) $\frac{25\pi}{2}$

Answer: (C) 15π · Official NTA final key

Q15 JEE Main 2026 · 28 Jan · Shift 1 MCQ

Let f be a polynomial function such that $f(x^2+1)=x^4+5x^2+2$, for all $x\in\mathbf{R}$. Then $\int_0^3 f(x)\,dx$ is equal to

(A) $\frac{5}{3}$
(B) $\frac{27}{2}$
(C) $\frac{33}{2}$
(D) $\frac{41}{3}$

Answer: (C) $\frac{33}{2}$ · Official NTA final key

Q16 JEE Main 2026 · 28 Jan · Shift 1 Numerical

The value of $\sum_{r=1}^{20}\left(\left|\sqrt{\pi\left(\int_0^r x\,|\sin \pi x|\,dx\right)}\right|\right)$ is _____.

Numerical value type: the answer is a number.

Answer: 210. · Official NTA final key

Q17 JEE Main 2026 · 28 Jan · Shift 2 MCQ

Let $[\cdot]$ denote the greatest integer function. Then $\int_{-\pi/2}^{\pi/2}\left(\frac{12(3+[x])}{3+[\sin x]+[\cos x]}\right)dx$ is equal to :

(A) $13\pi+1$

(B) $12\pi+5$

(C) $11\pi+2$

(D) $15\pi+4$

Answer: (C) $11\pi+2$ · Official NTA final key

Q18 JEE Main 2026 · 28 Jan · Shift 2 Numerical

Let f be a differentiable function satisfying $f(x)=1-2x+\int_0^x e^{(x-t)}f(t)\,dt$, $x\in\mathbf{R}$ and let $g(x)=\int_0^x (f(t)+2)^{15}(t-4)^6(t+12)^{17}\,dt$, $x\in\mathbf{R}$. If p and q respectively are the points of local minima and local maxima of g, then the value of $|p+q|$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 09. · Official NTA final key

Q19 JEE Main 2026 · 24 Jan · Shift 1 Numerical

Let a differentiable function f satisfy the equation $\int_0^{36} f\left(\frac{tx}{36}\right)dt=4\alpha f(x)$.

If $y=f(x)$ is a standard parabola passing through the points (2, 1) and $(-4,\beta)$, then β^{α} is equal to _____.

Numerical value type: the answer is a number.

Answer: 64. · Official NTA final key

Q20 JEE Main 2026 · 24 Jan · Shift 2 Numerical

If $f(x)$ satisfies the relation $f(x)=e^x+\int_0^1 (y+xe^x)f(y)\,dy$, then $e+f(0)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 2. · Official NTA final key

Q21 JEE Main 2026 · 23 Jan · Shift 1 MCQ

The value of the integral $\int_{\pi/24}^{5\pi/24}\frac{dx}{1+\sqrt[3]{\tan 2x}}$ is :

(A) $\frac{\pi}{6}$
(B) $\frac{\pi}{18}$
(C) $\frac{\pi}{12}$
(D) $\frac{\pi}{3}$

Answer: (C) $\frac{\pi}{12}$ · Official NTA final key

Q22 JEE Main 2026 · 23 Jan · Shift 1 · Numerical

Let f be a twice differentiable non-negative function such that $(f(x))^2 = 25 + \int_0^x \left((f(t))^2 + (f'(t))^2\right) dt$.

Then the mean of $f(\log_e(1)), f(\log_e(2)), \ldots\ldots, f(\log_e(625))$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 1565. · Official NTA final key

Q23 JEE Main 2026 · 23 Jan · Shift 2 · Numerical

The number of elements in the set $\mathrm{S} = \left\{x : x \in [0, 100] \text{ and } \int_0^x t^2 \sin(x-t)\,\mathrm{d}t = x^2\right\}$ is _____.

Numerical value type: the answer is a number.

Answer: 16. · Official NTA final key

Q24 JEE Main 2026 · 22 Jan · Shift 1 · MCQ

Let $f : [1, \infty) \to \mathbb{R}$ be a differentiable function. If $6\int_1^x f(t)\,dt = 3xf(x) + x^3 - 4$ for all $x \geq 1$, then the value of $f(2) - f(3)$ is

(A) 3
(B) -4
(C) -3
(D) 4

Answer: (A) 3 · Official NTA final key

Q25 JEE Main 2026 · 22 Jan · Shift 1 · MCQ

The value of $\int_{-\pi/2}^{\pi/2} \left(\frac{1}{[x]+4}\right) dx$, where $[\cdot]$ denotes the greatest integer function, is

(A) $\frac{1}{60}(\pi - 7)$
(B) $\frac{1}{60}(21\pi - 1)$
(C) $\frac{7}{60}(3\pi - 1)$
(D) $\frac{7}{60}(\pi - 3)$

Answer: (C) $\frac{7}{60}(3\pi - 1)$ · Official NTA final key

---

Q26 JEE Main 2026 · 22 Jan · Shift 2 · Numerical

Let $[\cdot]$ be the greatest integer function. If $\alpha = \int_0^{64} \left(x^{1/3} - [x^{1/3}]\right) dx$, then $\frac{1}{\pi}\int_0^{\alpha\pi} \left(\frac{\sin^2\theta}{\sin^6\theta + \cos^6\theta}\right) d\theta$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 36. · Official NTA final key

Q27 JEE Main 2026 · 21 Jan · Shift 1 · MCQ

The value of $\int_{-\pi/6}^{\pi/6} \left(\frac{\pi + 4x^{11}}{1 - \sin(|x| + \pi/6)}\right) dx$ is equal to :

(A) 8π
(B) 2π
(C) 6π
(D) 4π

Answer: (D) 4π · Official NTA final key

Q28 JEE Main 2026 · 21 Jan · Shift 1 · Numerical

$6\int_0^{\pi} |(\sin 3x + \sin 2x + \sin x)|\, dx$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 17. · Official NTA final key

Q29 JEE Main 2026 · 21 Jan · Shift 2 · Numerical

Let $[\cdot]$ denote the greatest integer function and $f(x) = \lim_{n\to\infty} \frac{1}{n^3} \sum_{k=1}^{n} \left[\frac{k^2}{3^x}\right]$. Then $12\sum_{j=1}^{\infty} f(j)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 2. · Official NTA final key

Q30 JEE Main 2026 · 21 Jan · Shift 2 Numerical

If $\int_0^1 4\cot^{-1}\left(1-2x+4x^2\right)dx = a\tan^{-1}(2) - b\log_e(5)$, where $a, b \in \mathbf{N}$, then $(2a+b)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 9. · Official NTA final key

Q31 JEE Main 2025 · 8 Apr · Shift 2 MCQ

The integral $\int_{-1}^{\frac{3}{2}} \left(\left|\pi^2 x \sin(\pi x)\right|\right) dx$ is equal to :

(A) $2+3\pi$

(B) $4+\pi$

(C) $1+3\pi$

(D) $3+2\pi$

Answer: (C) $1+3\pi$ · Key from source paper

Q32 JEE Main 2025 · 8 Apr · Shift 2 MCQ

Let $f(x)$ be a positive function and $I_1 = \int_{-\frac{1}{2}}^{1} 2xf(2x(1-2x))dx$ and $I_2 = \int_{-1}^{2} f(x(1-x))dx$. Then the value of $\frac{I_2}{I_1}$ is equal to _____.

(A) 6

(B) 9

(C) 4

(D) 12

Answer: (C) 4 · Key from source paper

Q33 JEE Main 2025 · 7 Apr · Shift 1 MCQ

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

(A) $\frac{\pi}{2\sqrt{3}}(\pi+4)$

(B) $\frac{\pi}{\sqrt{3}}(\pi+1)$

(C) $\frac{\pi}{\sqrt{3}}(\pi+2)$

(D) $\frac{\pi}{3\sqrt{3}}(\pi+6)$

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

Q34 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Let $f : [0,\infty) \to \mathbb{R}$ be a differentiable function such that

$f(x) = 1 - 2x + \int_0^x e^{x-t}f(t)dt$ for all $x \in [0,\infty)$

Then the area of the region bounded by $y = f(x)$ and the coordinate axes is

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

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

Q35 JEE Main 2025 · 4 Apr · Shift 1 MCQ

The value of $\int_{-1}^{1} \frac{\left(1+\sqrt{|x|-x}\right)e^{x}+\left(\sqrt{|x|-x}\right)e^{-x}}{e^{x}+e^{-x}}dx$ is equal to

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

Answer: (A) $1+\frac{2\sqrt{2}}{3}$ · Key from source paper

Q36 JEE Main 2025 · 3 Apr · Shift 1 MCQ

Let the domain of the function $f(x) = \log_2 \log_4 \log_6 \left(3 + 4x - x^2\right)$ be (a, b). If $\int_0^{b-a} \left[x^2\right] dx = p - \sqrt{q} - \sqrt{r}, p, q, r \in \square, \gcd(p, q, r) = 1$, where $[\cdot]$ is the greatest integer function, then $p + q + r$ is equal to

(A) 11
(B) 9
(C) 8
(D) 10

Answer: (D) 10 · Key from source paper

Q37 JEE Main 2025 · 3 Apr · Shift 2 MCQ

The integral $\int_0^{\pi} \frac{8xdx}{4\cos^2 x+\sin^2 x}$ is equal to

(A) π^2
(B) $2\pi^2$
(C) $\frac{3\pi^2}{2}$
(D) $4\pi^2$

Answer: (B) $2\pi^2$ · Key from source paper

Q38 JEE Main 2025 · 2 Apr · Shift 1 Numerical

Let [.] denote the greatest integer function. If $\int_0^{e^3} \left[\frac{1}{e^{x-1}}\right] dx = \alpha - \log_e 2$, then α^3 is equal to _____.

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q39 JEE Main 2025 · 2 Apr · Shift 2 MCQ

Let (a, b) be the point of intersection of the curve $x^2 = 2y$ and the straight line $y - 2x - 6 = 0$ in the second quadrant. Then the integral $I = \int_a^b \frac{9x^2}{1+5^x} dx$ is equal to :

(A) 24
(B) 27
(C) 18
(D) 21

Answer: (A) 24 · Key from source paper

Q40 JEE Main 2025 · 2 Apr · Shift 2 MCQ

Let $f : [1, \infty) \to [2, \infty)$ be a differentiable function. If $10 \int_1^x f(t)dt = 5xf(x) - x^5 - 9$ for all $x \geqslant 1$, then the value of $f(3)$ is :

(A) 26
(B) 32
(C) 18
(D) 22

Answer: (B) 32 · Key from source paper

Q41 JEE Main 2025 · 29 Jan · Shift 1 MCQ

The integral $80 \int_0^{\frac{\pi}{4}} \left(\frac{\sin\theta+\cos\theta}{9+16\sin 2\theta}\right) d\theta$ is equal to :

(A) $3 \log_e 4$
(B) $4 \log_e 3$
(C) $6 \log_e 4$
(D) $2 \log_e 3$

Answer: (B) $4 \log_e 3$ · Key from source paper

Q42 JEE Main 2025 · 29 Jan · Shift 1 Numerical

Let $f : (0, \infty) \to \mathbf{R}$ be a twice differentiable function. If for some $\mathrm{a} \neq 0$, $\int_0^1 f(\lambda x)\mathrm{d}\lambda = \mathrm{a}f(x)$, $f(1) = 1$ and $f(16) = \frac{1}{8}$, then $16 - f'\left(\frac{1}{16}\right)$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 112. · Key from source paper

EdLoop JEE

Q43 JEE Main 2025 · 29 Jan · Shift 2 MCQ

Let $f(x)=\int_0^t t\left(t^2-9t+20\right)dt, 1\le x\le 5$. If the range of f is $[\alpha,\beta]$, then $4(\alpha+\beta)$ equals :

(A) 253
(B) 154
(C) 125
(D) 157

Answer: (D) 157 · Key from source paper

Q44 JEE Main 2025 · 29 Jan · Shift 2 Numerical

If $24\int_0^{\frac{\pi}{4}}\left(\sin\left|4x-\frac{\pi}{12}\right|+[2\sin x]\right)dx=2\pi+\alpha$, where $[\cdot]$ denotes the greatest integer function, then α is equal to _____ .

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q45 JEE Main 2025 · 28 Jan · Shift 1 MCQ

Let for some function $y=f(x)$, $\int_0^x tf(t)dt=x^2f(x)$, $x>0$ and $f(2)=3$. Then $f(6)$ is equal to

(A) 1
(B) 3
(C) 6
(D) 2

Answer: (A) 1 · Key from source paper

Q46 JEE Main 2025 · 28 Jan · Shift 1 MCQ

If $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\frac{96x^2\cos^2 x}{(1+e^x)}dx=\pi\left(\alpha\pi^2+\beta\right)$, $\alpha,\beta\in\mathbb{Z}$, then $(\alpha+\beta)^2$ equals

(A) 64
(B) 196
(C) 144
(D) 100

Answer: (D) 100 · Key from source paper

Q47 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Let f be a real valued continuous function defined on the positive real axis such that $g(x)=\int_0^x \mathrm{t}f(\mathrm{t})\mathrm{dt}$. If $\mathrm{g}\left(x^3\right)=x^6+x^7$, then value of $\sum_{r=1}^{15} f\left(\mathrm{r}^3\right)$ is :

(A) 270
(B) 340
(C) 320
(D) 310

Answer: (D) 310 · Key from source paper

Q48 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Let $\mathrm{f}:\mathbf{R}\to\mathbf{R}$ be a twice differentiable function such that $f(2)=1$. If $\mathrm{F}(x)=xf(x)$ for all $x\in\mathbf{R}$, $\int_0^2 x\,\mathrm{F}'(x)\mathrm{d}x=6$ and $\int_0^2 x^2\,\mathrm{F}''(x)\mathrm{d}x=40$, then $\mathrm{F}'(2)+\int_0^2\mathrm{F}(x)\mathrm{d}x$ is equal to :

(A) 11
(B) 13
(C) 15
(D) 9

Answer: (A) 11 · Key from source paper

Q49 JEE Main 2025 · 24 Jan · Shift 1 MCQ

If $\mathrm{I}(m,n)=\int_0^1 x^{m-1}(1-x)^{n-1}dx$, $m,n>0$, then $\mathrm{I}(9,14)+\mathrm{I}(10,13)$ is

(A) I(19, 27)
(B) I(9, 1)
(C) $I(1,13)$
(D) I(9, 13)

Answer: (D) I(9, 13) · Key from source paper

Q50 JEE Main 2025 · 24 Jan · Shift 1 Numerical

Let f be a differentiable function such that $2(x+2)^2f(x)-3(x+2)^2=10\int_0^x(t+2)f(t)dt$, $x\geq 0$. Then $f(2)$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 19. · Key from source paper

Q51 JEE Main 2025 · 23 Jan · Shift 1 MCQ

The value of $\int_{e^2}^{e^4}\frac{1}{x}\left(\frac{e^{\left((\log_e x)^2+1\right)^{-1}}}{e^{\left((\log_e x)^2+1\right)^{-1}}+e^{\left((6-\log_e x)^2+1\right)^{-1}}}\right)dx$ is

(A) 2

(B) $\log_e 2$

(C) 1

(D) e^2

Answer: (C) 1 · Key from source paper

Q52 JEE Main 2025 · 23 Jan · Shift 2 MCQ

If $\mathrm{I} = \int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{3}{2}} x}{\sin^{\frac{3}{2}} x + \cos^{\frac{3}{2}} x}\,\mathrm{d}x$, then $\int_0^{2\mathrm{I}} \frac{x \sin x \cos x}{\sin^4 x + \cos^4 x}\,\mathrm{d}x$ equals :

(A) $\frac{\pi^2}{12}$

(B) $\frac{\pi^2}{4}$

(C) $\frac{\pi^2}{16}$

(D) $\frac{\pi^2}{8}$

Answer: (C) $\frac{\pi^2}{16}$ · Key from source paper

Q53 JEE Main 2025 · 22 Jan · Shift 1 MCQ

Let $f(x) = 7\tan^8 x + 7\tan^6 x - 3\tan^4 x - 3\tan^2 x$, $\mathrm{I}_1 = \int_0^{\pi/4} f(x)\mathrm{d}x$ and $\mathrm{I}_2 = \int_0^{\pi/4} x f(x)\mathrm{d}x$. Then $7\mathrm{I}_1 + 12\mathrm{I}_2$ is equal to :

(A) 2

(B) 1

(C) 2π

(D) π

Answer: (B) 1 · Key from source paper

Q54 JEE Main 2024 · 9 Apr · Shift 1 Numerical

Let $\lim_{n\to\infty}\left(\frac{n}{\sqrt{n^4+1}} - \frac{2n}{(n^2+1)\sqrt{n^4+1}} + \frac{n}{\sqrt{n^4+16}} - \frac{8n}{(n^2+4)\sqrt{n^4+16}} + \ldots + \frac{n}{\sqrt{n^4+n^4}} - \frac{2n\cdot n^2}{(n^2+n^2)\sqrt{n^4+n^4}}\right)$ be $\frac{\pi}{k}$, using only the principal values of the inverse trigonometric functions. Then k^2 is equal to _____

Numerical value type: the answer is a number.

Answer: 32. · Key from source paper

Q55 JEE Main 2024 · 9 Apr · Shift 2 MCQ

The integral $\int_{1/4}^{3/4} \cos\left(2\cot^{-1}\sqrt{\frac{1-x}{1+x}}\right)dx$ is equal to

(A) 1/2
(B) $-1/2$
(C) $-1/4$
(D) 1/4

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

Q56 JEE Main 2024 · 9 Apr · Shift 2 MCQ

Let $\int_0^x \sqrt{1-(y'(t))^2}\,dt = \int_0^x y(t)\,dt,\ 0 \le x \le 3,\ y \ge 0,\ y(0) = 0$. Then at $x = 2$, $y'' + y + 1$ is equal to

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

Answer: (A) 1 · Key from source paper

Q57 JEE Main 2024 · 8 Apr · Shift 1 MCQ

The value of $k \in \mathrm{N}$ for which the integral $I_n = \int_0^1 (1-x^k)^n dx, n \in \mathrm{N}$, satisfies $147I_{20} = 148I_{21}$ is

(A) 14
(B) 8
(C) 10
(D) 7

Answer: (D) 7 · Key from source paper

Q58 JEE Main 2024 · 8 Apr · Shift 2 MCQ

Let $\int_\alpha^{\log_e 4} \frac{dx}{\sqrt{e^x-1}} = \frac{\pi}{6}$. Then e^α and $e^{-\alpha}$ are the roots of the equation :

(A) $x^2 + 2x - 8 = 0$
(B) $x^2 - 2x - 8 = 0$
(C) $2x^2 - 5x + 2 = 0$
(D) $2x^2 - 5x - 2 = 0$

Answer: (C) $2x^2 - 5x + 2 = 0$ · Key from source paper

Q59 JEE Main 2024 · 6 Apr · Shift 1 MCQ

$\int_0^{\pi/4} \frac{\cos^2 x \sin^2 x}{(\cos^3 x + \sin^3 x)^2}\,dx$ is equal to

(A) 1/6
(B) 1/3
(C) 1/12
(D) 1/9

Answer: (A) 1/6 · Key from source paper

Q60 JEE Main 2024 · 6 Apr · Shift 1 · Numerical

Let $r_k = \frac{\int_0^1 (1-x^7)^k \, dx}{\int_0^1 (1-x^7)^{k+1} \, dx}$, $k \in \mathbb{N}$. Then the value of $\sum_{k=1}^{10} \frac{1}{7(r_k - 1)}$ is equal to _____

Numerical value type: the answer is a number.

Answer: 65. · Key from source paper

Q61 JEE Main 2024 · 6 Apr · Shift 2 · Numerical

Let $[t]$ denote the largest integer less than or equal to t. If $\int_0^3 \left([x^2] + \left[\frac{x^2}{2}\right]\right) dx = a + b\sqrt{2} - \sqrt{3} - \sqrt{5} + c\sqrt{6} - \sqrt{7}$, where a, b, c $\in$ **Z**, then a + b + c is equal to _____

Numerical value type: the answer is a number.

Answer: 23. · Key from source paper

Q62 JEE Main 2024 · 5 Apr · Shift 1 · MCQ

The value of $\int_{-\pi}^{\pi} \frac{2y(1+\sin y)}{1+\cos^2 y} \, dy$ is :

(A) $2\pi^2$
(B) $\frac{\pi^2}{2}$
(C) $\frac{\pi}{2}$
(D) π^2

Answer: (D) π^2 · Key from source paper

Q63 JEE Main 2024 · 5 Apr · Shift 2 · MCQ

Let $\beta(m, n) = \int_0^1 x^{m-1}(1-x)^{n-1} \, dx$, m, n > 0. If $\int_0^1 \left(1 - x^{10}\right)^{20} dx = a \times \beta(b, c)$, then $100(a + b + c)$ equals_____

(A) 1021
(B) 2120
(C) 2012
(D) 1120

Answer: (B) 2120 · Key from source paper

Q64 JEE Main 2024 · 5 Apr · Shift 2 · Numerical

If $f(t) = \int_0^{\pi} \frac{2x \, dx}{1 - \cos^2 t \sin^2 x}$, $0 < t < \pi$, then the value of $\int_0^{\frac{\pi}{2}} \frac{\pi^2 dt}{f(t)}$ equals _____

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q65 JEE Main 2024 · 4 Apr · Shift 1 MCQ

Let $f(x)=\begin{cases}-2, & -2\le x\le 0\\ x-2, & 0<x\le 2\end{cases}$ and $h(x)=f(|x|)+|f(x)|$. Then $\int_{-2}^{2}h(x)dx$ is equal to :

(A) 1
(B) 6
(C) 4
(D) 2

Answer: (D) 2 · Key from source paper

Q66 JEE Main 2024 · 4 Apr · Shift 2 MCQ

If the value of the integral $\int_{-1}^{1}\frac{\cos\alpha x}{1+3^x}dx$ is $\frac{2}{\pi}$. Then, a value of α is

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

Answer: (D) $\frac{\pi}{2}$ · Key from source paper

Q67 JEE Main 2024 · 1 Feb · Shift 1 MCQ

The value of the integral $\int_{0}^{\frac{\pi}{4}}\frac{x\,dx}{\sin^4 2x+\cos^4 2x}$ equals:

(A) $\frac{\sqrt{2}\pi^2}{8}$
(B) $\frac{\sqrt{2}\pi^2}{16}$
(C) $\frac{\sqrt{2}\pi^2}{32}$
(D) $\frac{\sqrt{2}\pi^2}{64}$

Answer: (C) $\frac{\sqrt{2}\pi^2}{32}$ · Key from source paper

---

Q68 JEE Main 2024 · 1 Feb · Shift 1 Numerical

If $\int_{-\pi/2}^{\pi/2}\frac{8\sqrt{2}\cos x\,dx}{1+e^{\sin x}1+\sin^4 x}=\alpha\pi+\beta\log_e 3+2\sqrt{2}$, where α,β are integers, then $\alpha^2+\beta^2$ equals _____

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q69 JEE Main 2024 · 1 Feb · Shift 2 MCQ

The value of $\int_{0}^{1}2x^3-3x^2-x+1\frac{1}{3}dx$ is equal to:

(A) 0
(B) 1
(C) 2
(D) -1

Answer: (A) 0 · Key from source paper

Q70 JEE Main 2024 · 1 Feb · Shift 2 MCQ

If $\int_0^{\frac{\pi}{3}} \cos^4 x dx = a\pi + b\sqrt{3}$, where a and b are rational numbers, then $9a + 8b$ is equal to:

(A) 2
(B) 1
(C) 3
(D) $\frac{3}{2}$

Answer: (A) 2 · Key from source paper

Q71 JEE Main 2024 · 1 Feb · Shift 2 Numerical

Let $f : 0, \infty \to R$ and $Fx = \int_0^x tftdt$. If $Fx^2 = x^4 + x^5$, then $\sum_{r=1}^{12} fr^2$ is equal to:

Numerical value type: the answer is a number.

Answer: 219. · Key from source paper

Q72 JEE Main 2024 · 31 Jan · Shift 1 Numerical

Let $f : \mathbb{R} \to \mathbb{R}$ be a function defined by $f(x) = \frac{4^x}{4^x+2}$ and $M = \int_{fa}^{f1-a} x \sin^4 x1 - x\, dx$, $N = \int_{fa}^{f1-a} \sin^4 x1 - x\, dx$; $a \neq \frac{1}{2}$. If $\alpha M = \beta N$, $\alpha,\ \beta \in \mathbb{N}$, then the least value of $\alpha^2 + \beta^2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q73 JEE Main 2024 · 31 Jan · Shift 2 MCQ

Let $f, g : 0, \infty \to R$ be two functions defined by $f(x) = \int_{-x}^{x} t - t^2 e^{-t^2}\, dt$ and $g(x) = \int_0^{x^2} t^{\frac{1}{2}} e^{-t^2}\, dt$. Then the value of $9f(\sqrt{\log_e 9}) + g(\sqrt{\log_e 9})$ is equal to

(A) 6
(B) 9
(C) 8
(D) 10

Answer: (C) 8 · Key from source paper

Q74 JEE Main 2024 · 31 Jan · Shift 2 Numerical

$\frac{120}{\pi^3} \int_0^{\pi} \frac{x^2 \sin x \cos x}{\sin^4 x + \cos^4 x} dx$ is equal to _____.

Numerical value type: the answer is a number.

Answer: -15. · Checked by our team

Q75 JEE Main 2024 · 30 Jan · Shift 1 MCQ

The value of $\lim_{n\to\infty}\sum_{k=1}^{n}\frac{n^3}{(n^2+k^2)(n^2+3k^2)}$ is :

(A) $\frac{(2\sqrt{3}+3)\pi}{24}$

(B) $\frac{13\pi}{8(4\sqrt{3}+3)}$

(C) $\frac{13(2\sqrt{3}-3)\pi}{8}$

(D) $\frac{\pi}{8(2\sqrt{3}+3)}$

Answer: (B) $\frac{13\pi}{8(4\sqrt{3}+3)}$ · Key from source paper

Q76 JEE Main 2024 · 30 Jan · Shift 1 Numerical

The value $9\int_0^9\left[\sqrt{\frac{10x}{x+1}}\right]dx$, where t denotes the greatest integer less than or equal to t, is _____.

Numerical value type: the answer is a number.

Answer: 155. · Key from source paper

Q77 JEE Main 2024 · 30 Jan · Shift 2 MCQ

Let $f:R\to R$ be a function defined $f(x)=\frac{x}{1+x^{41/4}}$ and $g(x)=f(f(f(f(x))))$ then $18\int_0^{\sqrt{2\sqrt{5}}}x^2g(x)\,dx$

(A) 33

(B) 36

(C) 42

(D) 39

Answer: (D) 39 · Key from source paper

Q78 JEE Main 2024 · 30 Jan · Shift 2 MCQ

Let $y=f(x)$ be a thrice differentiable function in $(-5,5)$. Let the tangents to the curve $y=f(x)$ at $(1,f(1))$ and $(3,f(3))$ make angles $\frac{\pi}{6}$ and $\frac{\pi}{4}$, respectively with positive x-axis. If $27\int_1^3 f'\,t^2+1\,f''\,t\,dt=\alpha+\beta\sqrt{3}$ where α,β are integers, then the value of $\alpha+\beta$ equals

(A) -14

(B) 26

(C) -16

(D) 36

Answer: (B) 26 · Key from source paper

Q79 JEE Main 2024 · 30 Jan · Shift 2 MCQ

Let $f : R \to R$ be defined $f(x) = ae^{2x} + be^{x} + cx$. If $f(0) = -1$, $f' \log_e 2 = 21$ and $\int_0^{\log 4} f(x) - cx\,dx = \frac{39}{2}$, then the value of $|a + b + c|$ equals:

(A) 16
(B) 10
(C) 12
(D) 8

Answer: (D) 8 · Key from source paper

Q80 JEE Main 2024 · 29 Jan · Shift 1 MCQ

$\lim_{x\to\frac{\pi}{2}} \left(\frac{1}{\left(x-\frac{\pi}{2}\right)^2} \int_{x^3}^{\left(\frac{\pi}{2}\right)^3} \cos\left(\frac{1}{t^3}\right) dt \right)$ is equal to

(A) $\frac{3\pi}{8}$
(B) $\frac{3\pi^2}{4}$
(C) $\frac{3\pi^2}{8}$
(D) $\frac{3\pi}{4}$

Answer: (C) $\frac{3\pi^2}{8}$ · Key from source paper

Q81 JEE Main 2024 · 29 Jan · Shift 1 MCQ

If the value of the integral $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\frac{x^2 \cos x}{1+\pi^x} + \frac{1+\sin^2 x}{1+e^{(\sin x)^{2023}}} \right) dx = \frac{\pi}{4}(\pi + a) - 2$, then the value of a is

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

Answer: (A) 3 · Key from source paper

Q82 JEE Main 2024 · 29 Jan · Shift 2 Numerical

If $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sqrt{1 - \sin 2x}\,dx = \alpha + \beta\sqrt{2} + \gamma\sqrt{3}$, where α, β and γ are rational numbers, then $3\alpha + 4\beta - \gamma$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q83 JEE Main 2024 · 27 Jan · Shift 1 MCQ

If $\int_0^1 \frac{1}{\sqrt{3+x}+\sqrt{1+x}}\,dx = a + b\sqrt{2} + c\sqrt{3}$, where a, b, c are rational numbers, then $2a + 3b - 4c$ is equal to :

EdLoop JEE

(A) 4
(B) 10
(C) 7
(D) 8

Answer: (D) 8 · Key from source paper

Q84 JEE Main 2024 · 27 Jan · Shift 1 MCQ

If $(a,\ b)$ be the orthocentre of the triangle whose vertices are $(1, 2)$, $(2, 3)$ and $(3, 1)$, and $I_1 = \int_a^b x \sin\left(4x - x^2\right) dx$, $I_2 = \int_a^b \sin\left(4x - x^2\right) dx$, then $36\frac{I_1}{I_2}$ is equal to :

(A) 72
(B) 88
(C) 80
(D) 66

Answer: (A) 72 · Key from source paper

Q85 JEE Main 2024 · 27 Jan · Shift 2 MCQ

For $0 < a < 1$, the value of the integral $\int_0^{\pi} \frac{dx}{1-2a\cos x+a^2}$ is :

(A) $\frac{\pi^2}{\pi+a^2}$
(B) $\frac{\pi^2}{\pi-a^2}$
(C) $\frac{\pi}{1-a^2}$
(D) $\frac{\pi}{1+a^2}$

Answer: (C) $\frac{\pi}{1-a^2}$ · Key from source paper

Q86 JEE Main 2024 · 27 Jan · Shift 2 Numerical

Let $fx = \int_0^x gt \log_e \frac{1-t}{1+t} dt$, where g is a continuous odd function. If $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} fx + \frac{x^2 \cos x}{1+e^x} dx = \frac{\pi^2}{\alpha} - \alpha$, then α is equal to _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q87 JEE Main 2023 · 15 Apr · Shift 1 MCQ

If $\int_0^1 \frac{1}{(5+2x-2x^2)(1+e^{(2-4x)})} dx = \frac{1}{\alpha} \log_e \left(\frac{\alpha+1}{\beta}\right)$, $\alpha, \beta > 0$, then $\alpha^4 - \beta^4$ is equal to

(A) 19
(B) -21
(C) 0
(D) 21

Answer: (D) 21 · Key from source paper

Q88 JEE Main 2023 · 13 Apr · Shift 1 MCQ

$\int_0^{\infty} \frac{6}{e^{3x}+6e^{2x}+11e^{x}+6}\,dx =$

(A) $\log_e\left(\frac{32}{27}\right)$
(B) $\log_e\left(\frac{512}{81}\right)$
(C) $\log_e\left(\frac{256}{81}\right)$
(D) $\log_e\left(\frac{302}{27}\right)$

Answer: (A) $\log_e\left(\frac{32}{27}\right)$ · Key from source paper

---

Q89 JEE Main 2023 · 13 Apr · Shift 1 MCQ

Among
$(S1): \lim_{n\to\infty} \frac{1}{n^2}\left(2+4+6+\ldots+2n\right)=1$
$(S2): \lim_{n\to\infty} \frac{1}{n^{16}}\left(1^{15}+2^{15}+3^{15}+\ldots+n^{15}\right)=\frac{1}{16}$

(A) Both $(S1)$ and $(S2)$ are true
(B) Only $(S1)$ is true
(C) Both $(S1)$ and $(S2)$ are false
(D) Only $(S2)$ is true

Answer: (A) Both $(S1)$ and $(S2)$ are true · Key from source paper

---

Q90 JEE Main 2023 · 13 Apr · Shift 1 Numerical

Let for $x \in \mathbb{R}$, $S_0(x)=x$, $S_k(x)=C_k x + k\int_0^x S_{k-1}(t)dt$ where $C_0=1$, $C_k = 1-\int_0^1 S_{k-1}(x)dx$, $k=1,2,3,\ldots$ Then $S_2(3)+6C_3$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 18. · Key from source paper

Q91 JEE Main 2023 · 13 Apr · Shift 2 MCQ

The value of $\dfrac{e^{-\frac{\pi}{4}}+\int_0^{\frac{\pi}{4}} e^{-x}\tan^{50}x\,dx}{\int_0^{\frac{\pi}{4}} e^{-x}\left(\tan^{49}x+\tan^{51}x\right)dx}$

(A) 51
(B) 50
(C) 25
(D) 49

Answer: (B) 50 · Key from source paper

Q92 JEE Main 2023 · 13 Apr · Shift 2 · Numerical

Let $f_n = \int_0^{\frac{\pi}{2}} \sum_{k=1}^{n} \sin^{k-1} x \sum_{k=1}^{n} (2k-1) \sin^{k-1} x \cos x \, dx$, $n \in \mathbb{N}$. Then $f_{21} - f_{20}$ is equal to

Numerical value type: the answer is a number.

Answer: 41. · Key from source paper

Q93 JEE Main 2023 · 12 Apr · Shift 1 · Numerical

If $\int_{-0.15}^{0.15} |100x^2 - 1| \, dx = \frac{k}{3000}$, then k is equal to _____.

Numerical value type: the answer is a number.

Answer: 575. · Key from source paper

Q94 JEE Main 2023 · 11 Apr · Shift 1 · Numerical

For $m,\ n > 0$, let $\alpha m, n = \int_0^2 t^m 1 + 3t^n dt$. If $11\alpha 10, 6 + 18\alpha 11, 5 = p14^6$, then p is equal to

Numerical value type: the answer is a number.

Answer: 32. · Key from source paper

Q95 JEE Main 2023 · 11 Apr · Shift 2 · MCQ

Let the function $f : [0, 2] \to \mathbb{R}$ be defined as $f(x) = \begin{cases} e^{\min\{x^2, x-[x]\}}, & x \in [0, 1) \\ e^{[x - \log_e x]}, & x \in [1, 2] \end{cases}$, where $[t]$ denotes the greatest integer less than or equal to t. Then the value of the integral $\int_0^2 x f(x) \, dx$ is

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

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

Q96 JEE Main 2023 · 11 Apr · Shift 2 · MCQ

If $f : \mathbb{R} \to \mathbb{R}$ be a continuous function satisfying $\int_0^{\frac{\pi}{2}} f(\sin 2x) \sin x \, dx + \alpha \int_0^{\frac{\pi}{4}} f(\cos 2x) \cos x \, dx = 0$, then the value of α is

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

Answer: (D) $-\sqrt{2}$ · Key from source paper

Q97 JEE Main 2023 · 10 Apr · Shift 1 MCQ

Let f be a differentiable function such that $x^2 fx - x = 4\int_0^x t\ ft\ dt$, $f1 = \frac{2}{3}$. Then $18\ f3$ is equal to

(A) 210
(B) 160
(C) 150
(D) 180

Answer: (B) 160 · Key from source paper

Q98 JEE Main 2023 · 10 Apr · Shift 2 MCQ

Let f be a continuous function satisfying $\int_0^{t^2}(f(x)+x^2)dx = \frac{4}{3}t^3, \forall t > 0$. Then $f\left(\frac{\pi^2}{4}\right)$ is equal to

(A) $\pi^2 1 - \frac{\pi^2}{16}$
(B) $-\pi 1 + \frac{\pi^3}{16}$
(C) $\pi 1 - \frac{\pi^3}{16}$
(D) $-\pi^2 1 + \frac{\pi^2}{16}$

Answer: (C) $\pi 1 - \frac{\pi^3}{16}$ · Key from source paper

Q99 JEE Main 2023 · 8 Apr · Shift 1 Numerical

Let $[t]$ denote the greatest integer $\leq t$. Then $\frac{2}{\pi}\int_{\pi/6}^{5\pi/6}(8[\operatorname{cosec} x] - 5[\cot x])dx$ is equal to _____

Numerical value type: the answer is a number.

Answer: 14. · Key from source paper

Q100 JEE Main 2023 · 8 Apr · Shift 2 Numerical

Let $[t]$ denote the greatest integer function. If $\int_0^{2.4}[x^2]\,dx = \alpha + \beta\sqrt{2} + \gamma\sqrt{3} + \delta\sqrt{5}$, then $\alpha + \beta + \gamma + \delta$ is equal to

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q101 JEE Main 2023 · 6 Apr · Shift 2 MCQ

Let $f(x)$ be a function satisfying $f(x) + f(\pi - x) = \pi^2, \forall x \in \mathbb{R}$. Then $\int_0^{\pi} f(x)\sin x\,dx$ is equal to

(A) $\frac{\pi^2}{4}$
(B) $2\pi^2$
(C) π^2
(D) $\frac{\pi^2}{2}$

Answer: (C) π^2 · Key from source paper

Q102 JEE Main 2023 · 6 Apr · Shift 2 Numerical

Let $f(x) = \frac{x}{(1+x^n)^{\frac{1}{n}}}$, $x \in \mathbb{R} - \{-1\}$, $n \in \mathbb{N}$, $n > 2$. If $f^n(x) = (fofof \ldots \text{upto } n \text{ times})(x)$, then $\lim_{n\to\infty} \int_0^1 x^{n-2}(f^n(x))dx$ is equal to

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q103 JEE Main 2023 · 1 Feb · Shift 1 MCQ

$\lim_{n\to\infty} \frac{1}{1+n} + \frac{1}{2+n} + \frac{1}{3+n} + \ldots + \frac{1}{2n}$ is equal to :-

(A) 0
(B) $\log_e 2$
(C) $\log_e \frac{3}{2}$
(D) $\log_e \frac{2}{3}$

Answer: (B) $\log_e 2$ · Key from source paper

Q104 JEE Main 2023 · 1 Feb · Shift 1 Numerical

If $\int_0^1 x^{21} + x^{14} + x^7 2x^{14} + 3x^7 + 6^{1/7} dx = \frac{1}{l} 11^{m/n}$ where $l, m, n \in N, m$ and n are co-prime then $l + m + n$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 63. · Key from source paper

Q105 JEE Main 2023 · 1 Feb · Shift 1 Numerical

Let $f : \mathbb{R} \to \mathbb{R}$ be a differentiable function such that $f'x + fx = \int_0^2 ftdt$. If $f0 = e^{-2}$, then $2f0 - f2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q106 JEE Main 2023 · 1 Feb · Shift 2 MCQ

The value of the integral $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{x + \frac{\pi}{4}}{2 - \cos 2x} dx$ is :

(A) $\frac{\pi^2}{6}$
(B) $\frac{\pi^2}{12\sqrt{3}}$
(C) $\frac{\pi^2}{3\sqrt{3}}$
(D) $\frac{\pi^2}{6\sqrt{3}}$

Answer: (D) $\frac{\pi^2}{6\sqrt{3}}$ · Key from source paper

---

Q107 JEE Main 2023 · 1 Feb · Shift 2 Numerical

If $\int_0^{\pi} \frac{5^{\cos x}(1+\cos x \cos 3x+\cos^2 x+\cos^3 x \cos 3x)dx}{1+5^{\cos x}} = \frac{k\pi}{16}$, then k is equal to _____.

Numerical value type: the answer is a number.

Answer: 13. · Key from source paper

Q108 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Let $\alpha \in 0,1$ and $\beta = \log_e 1-\alpha$. Let $P_n x = x + \frac{x^2}{2} + \frac{x^3}{3} + \ldots . + \frac{x^n}{n}$, $x \in 0,1$. Then the integral $\int_0^{\alpha} \frac{t^{50}}{1-t}dt$ is equal to

(A) $\beta - P_{50}\alpha$
(B) $-\beta + P_{50}\alpha$
(C) $P_{50}\alpha - \beta$
(D) $\beta + P_{50}\alpha$

Answer: (B) $-\beta + P_{50}\alpha$ · Key from source paper

Q109 JEE Main 2023 · 31 Jan · Shift 1 MCQ

The value of $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \frac{2+3\sin x}{\sin x 1+\cos x}dx$ is equal to

(A) $\frac{7}{2} - \sqrt{3} - \log_e \sqrt{3}$
(B) $-2 + 3\sqrt{3} + \log_e \sqrt{3}$
(C) $\frac{10}{3} - \sqrt{3} + \log_e \sqrt{3}$
(D) $\frac{10}{3} - \sqrt{3} - \log_e \sqrt{3}$

Answer: (C) $\frac{10}{3} - \sqrt{3} + \log_e \sqrt{3}$ · Key from source paper

---

Q110 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Let a differentiable function f satisfy $fx + \int_3^x \frac{ft}{t}dt = \sqrt{x+1}, x \geq 3$. Then $12f8$ is equal to:

(A) 34
(B) 19
(C) 17
(D) 1

Answer: (C) 17 · Key from source paper

Q111 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Let $\alpha > 0$. If $\int_0^{\alpha} \frac{x}{\sqrt{x+\alpha}-\sqrt{x}}dx = \frac{16+20\sqrt{2}}{15}$ then α is equal to :

(A) 2
(B) $2\sqrt{2}$
(C) 4
(D) $\sqrt{2}$

Answer: (A) 2 · Key from source paper

Q112 JEE Main 2023 · 31 Jan · Shift 2 MCQ

If $\phi(x) = \frac{1}{\sqrt{x}} \int_{\frac{\pi}{4}}^{x} \left(4\sqrt{2}\sin t - 3\phi'(t)\right) dt$, $x > 0$ then $\phi'\left(\frac{\pi}{4}\right)$ is equal to

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

Answer: (B) $\frac{8}{6+\sqrt{\pi}}$ · Key from source paper

Q113 JEE Main 2023 · 30 Jan · Shift 1 MCQ

If $[\,t$ denotes the greatest integer ≤ 1, then the value of $\frac{3e-1}{e}\int_1^2 x^2 e^{x+x^3}dx$ is :

(A) $e^9 - e$
(B) $e^8 - e$
(C) $e^7 - 1$
(D) $e^8 - 1$

Answer: (B) $e^8 - e$ · Key from source paper

Q114 JEE Main 2023 · 30 Jan · Shift 2 MCQ

$\lim_{n\to\infty} \frac{3}{n}\left\{4 + \left(2+\frac{1}{n}\right)^2 + \left(2+\frac{2}{n}\right)^2 + \cdots + \left(3-\frac{1}{n}\right)^2\right\}$ is equal to

(A) 12
(B) $\frac{19}{3}$
(C) 0
(D) 19

Answer: (D) 19 · Key from source paper

Q115 JEE Main 2023 · 29 Jan · Shift 1 MCQ

Let $f(x) = x + \frac{a}{\pi^2-4}\sin x + \frac{b}{\pi^2-4}\cos x$, $x \in \mathbb{R}$ be a function which satisfies $f(x) = x + \int_0^{\pi/2} \sin(x + y) f(y) dy$. Then $(a + b)$ is equal to

(A) $-\pi(\pi + 2)$
(B) $-2\pi(\pi + 2)$
(C) $-2\pi(\pi - 2)$
(D) $-\pi(\pi - 2)$

Answer: (B) $-2\pi(\pi + 2)$ · Key from source paper

Q116 JEE Main 2023 · 29 Jan · Shift 1 MCQ

Let $[x]$ denote the greatest integer $\leq x$. Consider the function $f(x) = \max\{x^2, 1 + [x]\}$. Then the value of the integral $\int_0^2 f(x)\,dx$ is :

(A) $\frac{5+4\sqrt{2}}{3}$
(B) $\frac{8+4\sqrt{2}}{3}$
(C) $\frac{1+5\sqrt{2}}{3}$
(D) $\frac{4+5\sqrt{2}}{3}$

Answer: (A) $\frac{5+4\sqrt{2}}{3}$ · Key from source paper

Q117 JEE Main 2023 · 29 Jan · Shift 2 MCQ

The value of the integral $\int_1^2 \left(\frac{t^4+1}{t^6+1}\right) dt$ is :

(A) $\tan^{-1}\frac{1}{2} + \frac{1}{3}\tan^{-1} 8 - \frac{\pi}{3}$
(B) $\tan^{-1} 2 - \frac{1}{3}\tan^{-1} 8 + \frac{\pi}{3}$
(C) $\tan^{-1} 2 + \frac{1}{3}\tan^{-1} 8 - \frac{\pi}{3}$
(D) $\tan^{-1}\frac{1}{2} - \frac{1}{3}\tan^{-1} 8 + \frac{\pi}{3}$

Answer: (C) $\tan^{-1} 2 + \frac{1}{3}\tan^{-1} 8 - \frac{\pi}{3}$ · Key from source paper

---

Q118 JEE Main 2023 · 29 Jan · Shift 2 MCQ

The value of the integral $\int_{1/2}^2 \frac{\tan^{-1} x}{x}\,dx$ is equal to

(A) $\pi \log_e 2$
(B) $\frac{1}{2} \log_e 2$
(C) $\frac{\pi}{4} \log_e 2$
(D) $\frac{\pi}{2} \log_e 2$

Answer: (D) $\frac{\pi}{2} \log_e 2$ · Key from source paper

Q119 JEE Main 2023 · 25 Jan · Shift 1 MCQ

The minimum value of the function $f(x) = \int_0^2 e^{|x-t|}\, dt$ is

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

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

Q120 JEE Main 2023 · 25 Jan · Shift 2 MCQ

The integral $16 \int_1^2 \frac{dx}{x^3(x^2+2)^2}$ is equal to

(A) $\frac{11}{6} + \log_e 4$
(B) $\frac{11}{12} + \log_e 4$
(C) $\frac{11}{12} - \log_e 4$
(D) $\frac{11}{6} - \log_e 4$

Answer: (D) $\frac{11}{6} - \log_e 4$ · Key from source paper

---

Q121 JEE Main 2023 · 25 Jan · Shift 2 Numerical

If $\int_{\frac{1}{3}}^{3} |\log_e x| dx = \frac{m}{n} \log_e \left(\frac{n^2}{e}\right)$, where m and n are coprime natural numbers, then $m^2 + n^2 - 5$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 20. · Key from source paper

Q122 JEE Main 2023 · 24 Jan · Shift 1 Numerical

The value of $\frac{8}{\pi} \int_0^{\frac{\pi}{2}} \frac{\cos x^{2023}}{\sin x^{2023} + \cos x^{2023}} dx$ is _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q123 JEE Main 2023 · 24 Jan · Shift 1 Numerical

The value of $12 \int_0^3 x^2 - 3x + 2\, dx$ is _____

Numerical value type: the answer is a number.

Answer: 22. · Key from source paper

Q124 JEE Main 2023 · 24 Jan · Shift 2 MCQ

$\int_{\frac{3\sqrt{2}}{4}}^{\frac{3\sqrt{3}}{4}} \frac{48}{\sqrt{9-4x^2}}\,dx$ is equal to

(A) $\frac{\pi}{3}$
(B) $\frac{\pi}{2}$
(C) $\frac{\pi}{6}$
(D) 2π

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

Q125 JEE Main 2023 · 24 Jan · Shift 2 Numerical

Let f be a differentiable function defined on $\left[0, \frac{\pi}{2}\right]$ such that $f(x) > 0$ and $f(x) + \int_0^x f(t)\sqrt{1-(\log_e(f(t)))^2}\,dt = e\ \forall x \in \left[0, \frac{\pi}{2}\right]$, then $\left\{6\log_e\left(f\left(\frac{\pi}{6}\right)\right)\right\}^2$ is equal to

Numerical value type: the answer is a number.

Answer: 27. · Key from source paper

Q126 JEE Main 2022 · 29 Jul · Shift 1 MCQ

If $f(\alpha) = \int_1^\alpha \frac{\log_{10} t}{1+t}dt, \alpha > 0$, then $f(e^3) + f(e^{-3})$ is equal to

(A) 9
(B) $\frac{9}{2}$
(C) $\frac{9}{\log_e(10)}$
(D) $\frac{9}{2\log_e(10)}$

Answer: (D) $\frac{9}{2\log_e(10)}$ · Key from source paper

Q127 JEE Main 2022 · 29 Jul · Shift 2 MCQ

If $[t]$ denotes the greatest integer $\leq t$, then the value of $\int_0^1 \left[2x - \left|3x^2 - 5x + 2\right| + 1\right] dx$ is

(A) $\frac{\sqrt{37}+\sqrt{13}-4}{6}$
(B) $\frac{\sqrt{37}-\sqrt{13}-4}{6}$
(C) $\frac{-\sqrt{37}-\sqrt{13}+4}{6}$
(D) $\frac{-\sqrt{37}+\sqrt{13}+4}{6}$

Answer: (A) $\frac{\sqrt{37}+\sqrt{13}-4}{6}$ · Key from source paper

Q128 JEE Main 2022 · 28 Jul · Shift 1 MCQ

The minimum value of the twice differentiable function $fx = \int_0^x e^{x-t}f'tdt - x^2 - x + 1e^x, x \in R$, is

(A) $-\frac{2}{\sqrt{e}}$
(B) $-2\sqrt{e}$
(C) $-\sqrt{e}$
(D) $\frac{2}{\sqrt{e}}$

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

Q129 JEE Main 2022 · 28 Jul · Shift 1 Numerical

If $\int_0^{\sqrt{3}} \frac{15x^3}{\sqrt{1+x^2+\sqrt{1+x^{2^3}}}}dx = \alpha\sqrt{2}+\beta\sqrt{3}$, where α, β are integers, then $\alpha+\beta$ is equal to

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q130 JEE Main 2022 · 28 Jul · Shift 2 MCQ

Let $I_n(x) = \int_0^x \frac{1}{(t^2+5)^n}dt, n = 1, 2, 3, \ldots$. Then

(A) $50I_6 - 9I_5 = xI_5'$
(B) $50I_6 - 11I_5 = xI_5'$
(C) $50I_6 - 9I_5 = I_5'$
(D) $50I_6 - 11I_5 = I_5'$

Answer: (A) $50I_6 - 9I_5 = xI_5'$ · Key from source paper

Q131 JEE Main 2022 · 28 Jul · Shift 2 Numerical

The value of the integral $\int_0^{\frac{\pi}{2}} 60\frac{\sin(6x)}{\sin x}dx$ is equal to

Numerical value type: the answer is a number.

Answer: 104. · Key from source paper

Q132 JEE Main 2022 · 27 Jul · Shift 1 MCQ

Let $f : \mathbb{R} \to \mathbb{R}$ be a function defined as $f(x) = a\sin\left(\frac{\pi[x]}{2}\right) + [2-x]$, $a \in \mathbb{R}$, where $[t]$ is the greatest integer less than or equal to t. If $\lim_{x\to -1} f(x)$ exists, then the value of $\int_0^4 f(x)dx$ is equal to

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

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

Q133 JEE Main 2022 · 27 Jul · Shift 2 MCQ

Let $f(x) = 2 + |x| - |x-1| + |x+1|$, $x \in R$.
Consider
$(S1) : f'\left(-\frac{3}{2}\right) + f'\left(-\frac{1}{2}\right) + f'\left(\frac{1}{2}\right) + f'\left(\frac{3}{2}\right) = 2$
$(S2) : \int_{-2}^{2} f(x)dx = 12$
Then,

(A) both $(S1)$ and $(S2)$ are correct
(B) both $(S1)$ and $(S2)$ are wrong
(C) only $(S1)$ is correct
(D) only $(S2)$ is correct

Answer: (D) only $(S2)$ is correct · Key from source paper

Q134 JEE Main 2022 · 27 Jul · Shift 2 MCQ

$\int_0^2 \left(|2x^2 - 3x| + \left[x - \frac{1}{2}\right]\right) dx$, where $[t]$ is the greatest integer function, is equal to

(A) $\frac{7}{6}$
(B) $\frac{19}{12}$
(C) $\frac{31}{12}$
(D) $\frac{3}{2}$

Answer: (B) $\frac{19}{12}$ · Key from source paper

Q135 JEE Main 2022 · 27 Jul · Shift 2 Numerical

Let $f(x) = \min\{[x-1], [x-2], \ldots, [x-10]\}$ where $[t]$ denotes the greatest integer $\leq t$. Then $\int_0^{10} f(x)dx + \int_0^{10} (f(x))^2 dx + \int_0^{10} |f(x)|dx$ is equal _____ . to

Numerical value type: the answer is a number.

Answer: 385. · Key from source paper

Q136 JEE Main 2022 · 27 Jul · Shift 2 Numerical

Let f be a differentiable function satisfying $f(x) = \frac{2}{\sqrt{3}} \int_0^{\sqrt{3}} f\left(\frac{\lambda^2 x}{3}\right) d\lambda$, $x > 0$ and $f(1) = \sqrt{3}$. If $y = f(x)$ passes through the point $(\alpha, 6)$, then α is equal to _____ .

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q137 JEE Main 2022 · 26 Jul · Shift 1 MCQ

If $a = \lim_{n\to\infty} \sum_{k=1}^{n} \frac{2n}{n^2+k^2}$ and $f(x) = \sqrt{\frac{1-\cos x}{1+\cos x}}$, $x \in (0, 1)$, then:

(A) $2\sqrt{2}f\left(\frac{a}{2}\right)=f'\left(\frac{a}{2}\right)$
(B) $f\left(\frac{a}{2}\right)f'\left(\frac{a}{2}\right)=\sqrt{2}$
(C) $\sqrt{2}f\left(\frac{a}{2}\right)=f'\left(\frac{a}{2}\right)$
(D) $f\left(\frac{a}{2}\right)=\sqrt{2}f'\left(\frac{a}{2}\right)$

Answer: (C) $\sqrt{2}f\left(\frac{a}{2}\right)=f'\left(\frac{a}{2}\right)$ · Key from source paper

---

Q138 JEE Main 2022 · 26 Jul · Shift 1 Numerical

If $n(2n+1)\int_0^1(1-x^n)^{2n}dx=1177\int_0^1(1-x^n)^{2n+1}dx$, then $n\in N$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 24. · Key from source paper

Q139 JEE Main 2022 · 26 Jul · Shift 2 MCQ

$\int_0^{20\pi}\sin x+\cos x^2dx$ is equal to:

(A) $10\pi+4$
(B) $10\pi+2$
(C) $20\pi-2$
(D) $20\pi+2$

Answer: (D) $20\pi+2$ · Key from source paper

Q140 JEE Main 2022 · 25 Jul · Shift 1 MCQ

For any real number x, let x denote the largest integer less than or equal to x. Let f be a real-valued function defined on the interval $-10,10$ by
$fx=x-x$, if x is odd
$fx=1+x-x$, if x is even
Then, the value of $\frac{\pi^2}{10}\int_{-10}^{10}fx\ \cos\pi x dx$ is

(A) 4
(B) 2
(C) 1
(D) 0

Answer: (A) 4 · Key from source paper

Q141 JEE Main 2022 · 25 Jul · Shift 1 Numerical

If $\lim_{n\to\infty}\frac{n+1^{k-1}}{n^{k+1}}(nk+1)+(nk+2)+\ldots+nk+n=33\cdot\lim_{n\to\infty}\frac{1}{n^{k+1}}\cdot 1^k+2^k+3^k+\ldots+n^k$, then the integral value of k is equal to _____.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q142 JEE Main 2022 · 25 Jul · Shift 2 MCQ

$\lim_{n\to\infty} \frac{1}{2^n}\left(\frac{1}{\sqrt{1-\frac{1}{2^n}}}+\frac{1}{\sqrt{1-\frac{2}{2^n}}}+\frac{1}{\sqrt{1-\frac{3}{2^n}}}+\ldots+\frac{1}{\sqrt{1-\frac{2^n-1}{2^n}}}\right)$ is equal to

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

(B) 1

(C) 2

(D) -2

Answer: (C) 2 · Key from source paper

Q143 JEE Main 2022 · 25 Jul · Shift 2 MCQ

Let $[t]$ denote the greatest integer less than or equal to t. Then the value of the integral $\int_{-3}^{101}\left([\sin(\pi x)]+e^{[\cos(2\pi x)]}\right)dx$ is equal to

(A) $\frac{52(1-e)}{e}$

(B) $\frac{52}{e}$

(C) $\frac{52(2+e)}{e}$

(D) $\frac{104}{e}$

Answer: (B) $\frac{52}{e}$ · Key from source paper

Q144 JEE Main 2022 · 25 Jul · Shift 2 Numerical

Let f be a twice differentiable function on R. If $f'(0)=4$ and $f(x)+\int_0^x(x-t)f'(t)dt=\left(e^{2x}+e^{-2x}\right)\cos 2x+\frac{2}{a}x$, then $(2a+1)^5a^2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q145 JEE Main 2022 · 25 Jul · Shift 2 Numerical

Let $a_n=\int_{-1}^{n}\left(1+\frac{x}{2}+\frac{x^2}{3}+\ldots+\frac{x^{n-1}}{n}\right)dx$ for every $n\in N$. Then the sum of all the elements of the set $\{n\in N: a_n\in(2,30)\}$ is _____.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q146 JEE Main 2022 · 29 Jun · Shift 1 MCQ

$\int_0^5\cos\left(\pi\left(x-\left[\frac{x}{2}\right]\right)\right)dx$, where $[t]$ denotes greatest integer less than or equal to t, is equal to

(A) 0
(B) 2
(C) -3
(D) 4

Answer: (A) 0 · Key from source paper

Q147 JEE Main 2022 · 29 Jun · Shift 2 MCQ

Let f be a real valued continuous function on $[0,\ 1]$ and $f(x) = x + \int_0^1 (x-t)f(t)dt$. Then which of the following points $(x,\ y)$ lies on the curve $y = f(x)$?

(A) $(2,\ 4)$
(B) $(1,\ 2)$
(C) $(4,\ 17)$
(D) $(6,\ 8)$

Answer: (D) $(6,\ 8)$ · Key from source paper

Q148 JEE Main 2022 · 28 Jun · Shift 1 MCQ

Let $[t]$ denote the greatest integer less than or equal to t. Then, the value of the integral $\int_0^1 \left[-8x^2 + 6x - 1\right] dx$ is equal to

(A) -1
(B) $-\frac{5}{4}$
(C) $\frac{\sqrt{17} - 13}{8}$
(D) $\frac{\sqrt{17} - 16}{8}$

Answer: (C) $\frac{\sqrt{17} - 13}{8}$ · Key from source paper

---

Q149 JEE Main 2022 · 28 Jun · Shift 2 MCQ

Let $f : \mathbf{R} \to \mathbf{R}$ be a differentiable function such that $f\left(\frac{\pi}{4}\right) = \sqrt{2}, f\left(\frac{\pi}{2}\right) = 0$ and $f'\left(\frac{\pi}{2}\right) = 1$ and let $g(x) = \int_x^{\frac{\pi}{4}} \left(f'(t)\sec t + \tan t \sec t f(t)\right) dt$ for $x \in \left[\frac{\pi}{4}, \frac{\pi}{2}\right)$. Then $\lim_{x \to \left(\frac{\pi}{2}\right)^-} g(x)$ is equal to

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

Answer: (B) 3 · Key from source paper

Q150 JEE Main 2022 · 28 Jun · Shift 2 MCQ

Let $f : \mathbf{R} \to \mathbf{R}$ be continuous function satisfying $f(x) + f(x+k) = n$, for all $x \in \mathbf{R}$ where $k > 0$ and n is a positive integer. If $I_1 = \int_0^{4nk} f(x)dx$ and $I_2 = \int_{-k}^{3k} f(x)dx$, then

(A) $I_1 + 2I_2 = 4nk$
(B) $I_1 + 2I_2 = 2nk$
(C) $I_1 + nI_2 = 4n^2\,K$
(D) $I_1 + nI_2 = 6n^2k$

Answer: (C) $I_1 + nI_2 = 4n^2\,K$ · Key from source paper

Q151 JEE Main 2022 · 27 Jun · Shift 1 MCQ

The value of the integral $\int_{-2}^{2} \frac{|x^3+x|}{(e^{x|x|}+1)}\,dx$ is equal to

(A) $5e^2$
(B) $3e^{-2}$
(C) 4
(D) 6

Answer: (D) 6 · Key from source paper

Q152 JEE Main 2022 · 27 Jun · Shift 2 MCQ

Let f be a differentiable function in $\left(0, \frac{\pi}{2}\right)$. If $\int_{\cos x}^{1} t^2 f(t)\,dt = \sin^3 x + \cos x$, then $\frac{1}{\sqrt{3}} f'\left(\frac{1}{\sqrt{3}}\right)$ is equal to

(A) $6 - 9\sqrt{2}$
(B) $6 + \frac{9}{\sqrt{2}}$
(C) $6 - \frac{9}{\sqrt{2}}$
(D) $3 + \sqrt{2}$

Answer: (C) $6 - \frac{9}{\sqrt{2}}$ · Key from source paper

Q153 JEE Main 2022 · 27 Jun · Shift 2 MCQ

The integral $\int_0^1 \frac{1}{7^{\left[\frac{1}{x}\right]}}\,dx$, where $[\cdot]$ denotes the greatest integer function, is equal to

(A) $1 - 6\ln\left(\frac{6}{7}\right)$
(B) $1 + 6\ln\left(\frac{6}{7}\right)$
(C) $1 - 7\ln\left(\frac{6}{7}\right)$
(D) $1 + 7\ln\left(\frac{6}{7}\right)$

Answer: (B) $1 + 6\ln\left(\frac{6}{7}\right)$ · Key from source paper

EdLoop JEE

Q154 JEE Main 2022 · 26 Jun · Shift 1 Numerical

Let $f(x) = \max\{|x+1|, |x+2|, \ldots, |x+5|\}$. Then $\int_{-6}^{0} f(x)dx$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 21. · Key from source paper

Q155 JEE Main 2022 · 26 Jun · Shift 1 Numerical

The value of the integral $\frac{48}{\pi^4}\int_0^{\pi}\left(\frac{3\pi x^2}{2} - x^3\right)\frac{\sin x}{1+\cos^2 x}dx$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q156 JEE Main 2022 · 26 Jun · Shift 2 Numerical

The integral $\frac{24}{\pi}\int_0^{\sqrt{2}}\frac{(2-x^2)\,dx}{(2+x^2)\sqrt{4+x^4}}$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q157 JEE Main 2022 · 25 Jun · Shift 1 MCQ

The value of $\int_0^{\pi}\frac{e^{\cos x}\sin x}{1+\cos^2 x e^{\cos x}+e^{-\cos x}}dx$ is equal to

(A) $\frac{\pi^2}{4}$

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{6}$

(D) $\frac{\pi^2}{2}$

Answer: (B) $\frac{\pi}{4}$ · Key from source paper

Q158 JEE Main 2022 · 25 Jun · Shift 2 MCQ

If $b_n = \int_0^{\frac{\pi}{2}}\frac{\cos^2 nx}{\sin x}dx$, $n \in \mathbb{N}$, then

(A) $b_3 - b_2, b_4 - b_3, b_5 - b_4$ are in an A.P. with common difference-2

(B) $\frac{1}{b_3-b_2}, \frac{1}{b_4-b_3}, \frac{1}{b_5-b_4}$ are in an A.P. with common difference 2

(C) $b_3 - b_2, b_4 - b_3, b_5 - b_4$ are in a G.P.

(D) $\frac{1}{b_3-b_2}, \frac{1}{b_4-b_3}, \frac{1}{b_5-b_4}$ are in an A.P. with common difference -2

Answer: (D) $\frac{1}{b_3-b_2}, \frac{1}{b_4-b_3}, \frac{1}{b_5-b_4}$ **are in an A.P. with common difference -2** · Key from source paper

Q159 JEE Main 2022 · 25 Jun · Shift 2 Numerical

The value of $b > 3$ for which $12\int_3^b\frac{1}{x^2-1x^2-4}dx = \log_e\frac{49}{40}$, is equal to _____ .

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q160 JEE Main 2022 · 24 Jun · Shift 1 Numerical

If $f(\theta) = \sin\theta + \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (\sin\theta + t\cos\theta)\cdot f(t)dt$, then $\left|\int_0^{\frac{\pi}{2}} f(\theta)d\theta\right|$ is

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q161 JEE Main 2022 · 24 Jun · Shift 1 Numerical

Let $\underset{0\le x\le 2}{\text{Max}}\left\{\frac{9-x^2}{5-x}\right\} = \alpha$ and $\underset{0\le x\le 2}{\text{Min}}\left\{\frac{9-x^2}{5-x}\right\} = \beta$. If $\int_{\beta-\frac{8}{3}}^{2\alpha-1} \text{Max}\left\{\frac{9-x^2}{5-x}, x\right\}dx = \alpha_1 + \alpha_2\log_e\left(\frac{8}{15}\right)$, then $\alpha_1+\alpha_2$ is equal to _____

Numerical value type: the answer is a number.

Answer: 34. · Key from source paper

Q162 JEE Main 2022 · 24 Jun · Shift 2 MCQ

The value of the integral $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{dx}{(1+e^x)(\sin^6 x+\cos^6 x)}$ is equal to

(A) 2π
(B) 0
(C) π
(D) $\frac{\pi}{2}$

Answer: (C) π · Key from source paper

Q163 JEE Main 2022 · 24 Jun · Shift 2 MCQ

$\lim_{n\to\infty}\left(\frac{n^2}{(n^2+1)(n+1)} + \frac{n^2}{(n^2+4)(n+2)} + \frac{n^2}{(n^2+9)(n+3)} + \ldots + \frac{n^2}{(n^2+n^2)(n+n)}\right)$ is equal to

(A) $\frac{\pi}{8} + \frac{1}{4}\ln 2$
(B) $\frac{\pi}{4} + \frac{1}{8}\ln 2$
(C) $\frac{\pi}{4} - \frac{1}{8}\ln 2$
(D) $\frac{\pi}{8} + \ln\sqrt{2}$

Answer: (A) $\frac{\pi}{8} + \frac{1}{4}\ln 2$ · Key from source paper

Q164 JEE Main 2021 · 1 Sep · Shift 2 MCQ

Let f : R $\to$ R be a continuous function. Then $\lim_{x\to\pi/4} \frac{\frac{\pi}{4}\int_2^{\sec^2 x} f(x)\text{dx}}{x^2-\frac{\pi^2}{16}}$ is equal to :

(A) $f(2)$
(B) $2f(\sqrt{2})$
(C) $2f(2)$
(D) $4f(2)$

Answer: (C) $2f(2)$ · Key from source paper

Q165 JEE Main 2021 · 1 Sep · Shift 2 MCQ

The function $f(x)$, that satisfies the condition $f(x) = x + \int_0^{\pi/2} \sin x \cos y \, f(y)\, dy$, is :

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

Answer: (D) $x + (\pi - 2)\sin x$ · Key from source paper

Q166 JEE Main 2021 · 31 Aug · Shift 1 MCQ

Let f be a non-negative function in $[0,1]$ and twice differentiable in $(0,1)$. If $\int_0^x \sqrt{1-(f'(t))^2}\,\mathrm{d}t = \int_0^x f(t)\,\mathrm{d}t, 0 \le x \le 1$ and $f(0) = 0$, then $\lim_{x\to 0} \frac{1}{x^2}\int_0^x f(t)\,\mathrm{d}t$:

(A) does not exist
(B) equals 0
(C) equals 1
(D) equals $\frac{1}{2}$

Answer: (D) equals $\frac{1}{2}$ · Key from source paper

Q167 JEE Main 2021 · 31 Aug · Shift 1 Numerical

Let $[t]$ denote the greatest integer $\le$ t. Then the value of $8 \cdot \int_{-\frac{1}{2}}^{1} ([2x] + |x|)\, dx$ is _____

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q168 JEE Main 2021 · 31 Aug · Shift 1 Numerical

If $x\phi(x) = \int_5^x \left(3t^2 - 2\phi'(t)\right) dt$, $x > -2$, $\phi(0) = 4$, then $\phi(2)$ is _____

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q169 JEE Main 2021 · 31 Aug · Shift 2 MCQ

If x is the greatest integer $\le x$, then $\pi^2 \int_0^2 \sin\frac{\pi x}{2} x - x^{[x]} dx$ is equal to :

(A) $2(\pi+1)$
(B) $4(\pi-1)$
(C) $2(\pi-1)$
(D) $4(\pi+1)$

Answer: (B) $4(\pi-1)$ · Key from source paper

Q170 JEE Main 2021 · 27 Aug · Shift 1 MCQ

If $U_n = \left(1+\frac{1}{n^2}\right)\left(1+\frac{2^2}{n^2}\right)^2 \ldots \left(1+\frac{n^2}{n^2}\right)^n$, then $\lim_{n\to\infty}(U_n)^{\frac{-4}{n^2}}$ is equal to

(A) $\frac{16}{e^2}$
(B) $\frac{4}{e}$
(C) $\frac{4}{e^2}$
(D) $\frac{e^2}{16}$

Answer: (D) $\frac{e^2}{16}$ · Key from source paper

Q171 JEE Main 2021 · 27 Aug · Shift 1 MCQ

$\int_6^{16} \frac{\log_e x^2}{\log_e x^2+\log_e(x^2-44x+484)}dx$ is equal to

(A) 5
(B) 10
(C) 8
(D) 6

Answer: (A) 5 · Key from source paper

Q172 JEE Main 2021 · 27 Aug · Shift 2 MCQ

The value of the integral $\int_0^1 \frac{\sqrt{x}dx}{(1+x)(1+3x)(3+x)}$ is:

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

Answer: (C) $\frac{\pi}{8}\left(1-\frac{\sqrt{3}}{2}\right)$ · Key from source paper

Q173 JEE Main 2021 · 26 Aug · Shift 1 MCQ

The value of $\lim_{n\to\infty}\frac{1}{n}\sum_{r=0}^{2n-1}\frac{n^2}{n^2+4r^2}$ is:

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

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

Q174 JEE Main 2021 · 26 Aug · Shift 1 MCQ

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

(A) $\log_e 4$
(B) $2\log_e 16$
(C) $\log_e 16$
(D) $4\log_e\left(3+2\sqrt{2}\right)$

Answer: (C) $\log_e 16$ · Key from source paper

Q175 JEE Main 2021 · 26 Aug · Shift 2 MCQ

The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\left(\frac{1+\sin^2 x}{1+\pi^{\sin x}}\right)dx$ is :

(A) $\frac{\pi}{2}$
(B) $\frac{5\pi}{2}$
(C) $\frac{3\pi}{2}$
(D) $\frac{3\pi}{4}$

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

Q176 JEE Main 2021 · 26 Aug · Shift 2 MCQ

If the value of the integral $\int_0^5 \frac{x+[x]}{e^{x-[x]}}dx=\alpha e^{-1}+\beta$, where $\alpha,\ \beta\in R$, $5\alpha+6\beta=0$, and $[x]$ denotes the greatest integer less than or equal to x; then the value of $(\alpha+\beta)^2$ is equal to :

(A) 25
(B) 100
(C) 36
(D) 16

Answer: (A) 25 · Key from source paper

Q177 JEE Main 2021 · 27 Jul · Shift 1 MCQ

The value of $\lim_{n\to\infty}\frac{1}{n}\sum_{j=1}^{n}\frac{(2j-1)+8n}{(2j-1)+4n}$ is equal to:

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

Answer: (D) $1+2\log_e\left(\frac{3}{2}\right)$ · Key from source paper

---

Q178 JEE Main 2021 · 27 Jul · Shift 1 MCQ

The value of the definite integral $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{dx}{(1+e^{x\cos x})(\sin^4 x+\cos^4 x)}$ is equal to :

(A) $-\frac{\pi}{2}$
(B) $\frac{\pi}{2\sqrt{2}}$
(C) $-\frac{\pi}{4}$
(D) $\frac{\pi}{\sqrt{2}}$

Answer: (B) $\frac{\pi}{2\sqrt{2}}$ · Key from source paper

Q179 JEE Main 2021 · 27 Jul · Shift 1 Numerical

Let the domain of the function $f(x)=\log_4(\log_5(\log_3(18x-x^2-77)))$ be (a,b). Then the value of the integral $\int_a^b \frac{\sin^3 x}{(\sin^3 x+\sin^3(a+b-x))}dx$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q180 JEE Main 2021 · 27 Jul · Shift 1 Numerical

Let $F:[3,5]\to R$ be a twice differentiable function on $(3,5)$ such that $F(x)=e^{-x}\int_3^x(3t^2+2t+4F'(t))dt$. If $F'(4)=\frac{\alpha e^\beta-224}{(e^\beta-4)^2}$, then $\alpha+\beta$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 16. · Key from source paper

Q181 JEE Main 2021 · 27 Jul · Shift 2 Numerical

If $\int_0^\pi\left(\sin^3 x\right)e^{-\sin^2 x}dx=\alpha-\frac{\beta}{e}\int_0^1\sqrt{t}e^t dt$, then $\alpha+\beta$ is equal to

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q182 JEE Main 2021 · 25 Jul · Shift 1 MCQ

The value of the definite integral $\int_{\pi/24}^{5\pi/24}\frac{dx}{1+\sqrt[3]{\tan 2x}}$ is

(A) $\frac{\pi}{3}$
(B) $\frac{\pi}{6}$
(C) $\frac{\pi}{12}$
(D) $\frac{\pi}{18}$

Answer: (C) $\frac{\pi}{12}$ · Key from source paper

Q183 JEE Main 2021 · 25 Jul · Shift 2 MCQ

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

(A) 2
(B) 0
(C) -1
(D) 1

Answer: (B) 0 · Key from source paper

Q184 JEE Main 2021 · 22 Jul · Shift 1 MCQ

If $\int_0^{100\pi} \frac{\sin^2 x}{e^{\left(\frac{x}{\pi}-\left[\frac{x}{\pi}\right]\right)}} dx = \frac{\alpha\pi^3}{1+4\pi^2}$, $\alpha \in R$ where $[x]$ is the greatest integer less than or equal to x, then the value of α is:

(A) $200\left(1-e^{-1}\right)$
(B) $100(1-e)$
(C) $50(e-1)$
(D) $150\left(e^{-1}-1\right)$

Answer: (A) $200\left(1-e^{-1}\right)$ · Key from source paper

---

Q185 JEE Main 2021 · 20 Jul · Shift 1 MCQ

Let a be a positive real number such that $\int_0^a e^{x-[x]} dx = 10e-9$ where $[x]$ is the greatest integer less than or equal to x. Then, a is equal to:

(A) $10-\log_e(1+e)$
(B) $10+\log_e 2$
(C) $10+\log_e 3$
(D) $10+\log_e(1+e)$

Answer: (B) $10+\log_e 2$ · Key from source paper

Q186 JEE Main 2021 · 20 Jul · Shift 1 MCQ

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

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

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

Q187 JEE Main 2021 · 20 Jul · Shift 2 MCQ

If $[x]$ denotes the greatest integer less than or equal to x, then the value of the integral $\int_{-\pi/2}^{\pi/2} [[x] - \sin x]\, dx$ is equal to:

(A) $-\pi$
(B) π
(C) 0
(D) 1

Answer: (A) $-\pi$ · Key from source paper

Q188 JEE Main 2021 · 20 Jul · Shift 2 MCQ

If $f : R \to R$ is given by $f(x) = x + 1$, then the value of $\lim_{n\to\infty} \frac{1}{n}\left[f(0) + f\left(\frac{5}{n}\right) + f\left(\frac{10}{n}\right) + \ldots.. + f\left(\frac{5(n-1)}{n}\right)\right]$ is:

(A) $\frac{3}{2}$
(B) $\frac{5}{2}$
(C) $\frac{1}{2}$
(D) $\frac{7}{2}$

Answer: (D) $\frac{7}{2}$ · Key from source paper

Q189 JEE Main 2021 · 20 Jul · Shift 2 MCQ

Let $g(t) = \int_{-\pi/2}^{\pi/2} \left(\cos\frac{\pi}{4}t + f(x)\right) dx$, where $f(x) = \log_e\left(x + \sqrt{x^2+1}\right)$, $x \in R$. Then which one of the following is correct

(A) $g(1) = g(0)$
(B) $\sqrt{2}\, g(1) = g(0)$
(C) $g(1) = \sqrt{2}\, g(0)$
(D) $g(1) + g(0) = 0$

Answer: (B) $\sqrt{2}\, g(1) = g(0)$ · Key from source paper

Q190 JEE Main 2021 · 18 Mar · Shift 1 Numerical

Let $f(x)$ and $g(x)$ be two functions satisfying $f\left(x^2\right) + g(4-x) = 4x^3$ and $g(4-x) + g(x) = 0$, then the value of $\int_{-4}^{4} f\left(x^2\right) dx$ is

Numerical value type: the answer is a number.

Answer: 512. · Key from source paper

Q191 JEE Main 2021 · 18 Mar · Shift 2 MCQ

Let $g(x)=\int_0^x f(t)dt$, where f is continuous function in $[0,3]$ such that $\frac{1}{3}\le f(t)\le 1$ for $t\in[0,1]$ and $0\le f(t)\le\frac{1}{2}$ for all $t\in(1,3]$.
The largest possible interval in which $g(3)$ lies is :

(A) $\left[-1,-\frac{1}{2}\right]$
(B) $\left[-\frac{3}{2},-1\right]$
(C) $\left[\frac{1}{3},2\right]$
(D) $[1,3]$

Answer: (C) $\left[\frac{1}{3},2\right]$ · Key from source paper

---

Q192 JEE Main 2021 · 17 Mar · Shift 1 MCQ

Which of the following statement is correct for the function $g(\alpha)$ for $\alpha\in R$ such that $g(\alpha)=\int_{\frac{\pi}{6}}^{\frac{\pi}{3}}\frac{\sin^\alpha x}{\cos^\alpha x+\sin^\alpha x}dx$

(A) $g(\alpha)$ is a strictly increasing function
(B) $g(\alpha)$ has an inflection point at $\alpha=-\frac{1}{2}$
(C) $g(\alpha)$ is a strictly decreasing function
(D) $g(\alpha)$ is an even function

Answer: (D) $g(\alpha)$ **is an even function** · Key from source paper

---

Q193 JEE Main 2021 · 17 Mar · Shift 1 Numerical

If $[\cdot]$ represents the greatest integer function, then the value of $\left|\int_0^{\sqrt{\frac{\pi}{2}}}\left[\left[x^2\right]-\cos x\right]dx\right|$ is _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q194 JEE Main 2021 · 17 Mar · Shift 2 MCQ

Let $f:R\to R$ be defined as $f(x)=e^{-x}\sin x$. If $F:[0,1]\to R$ is a differentiable function such that $F(x)=\int_0^x f(t)dt$, then the value of $\int_0^1\left(F'(x)+f(x)\right)e^x dx$ lies in the interval :

(A) $\left[\frac{327}{360},\frac{329}{360}\right]$
(B) $\left[\frac{330}{360},\frac{331}{360}\right]$
(C) $\left[\frac{331}{360},\frac{334}{360}\right]$
(D) $\left[\frac{335}{360},\frac{336}{360}\right]$

Answer: (B) $\left[\frac{330}{360},\frac{331}{360}\right]$ · Key from source paper

Q195 JEE Main 2021 · 17 Mar · Shift 2 MCQ

If the integral $\int_0^{10} \frac{[\sin 2\pi x]}{e^{x-[x]}}dx = \alpha e^{-1} + \beta e^{-\frac{1}{2}} + \gamma$, where α, β, γ are integers and $[x]$ denotes the greatest integer less than or equal to x, then the value of $\alpha + \beta + \gamma$ is equal to:

(A) 0
(B) 20
(C) 25
(D) 10

Answer: (A) 0 · Key from source paper

Q196 JEE Main 2021 · 17 Mar · Shift 2 Numerical

Let $I_n = \int_1^e x^{19}(\log|x|)^n dx$, where $n \in N$. If $(20)I_{10} = \alpha I_9 + \beta I_8$, for natural numbers α and β, then $\alpha - \beta$ equal to _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q197 JEE Main 2021 · 16 Mar · Shift 1 Numerical

Let $f : (0, 2) \to R$ be defined as $f(x) = \log_2\left(1 + \tan\left(\frac{\pi x}{4}\right)\right)$.
Then, $\lim_{n\to\infty} \frac{2}{n}\left(f\left(\frac{1}{n}\right) + f\left(\frac{2}{n}\right) + \ldots. + f(1)\right)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q198 JEE Main 2021 · 16 Mar · Shift 1 Numerical

Let $f : R \to R$ be a continuous function such that $f(x) + f(x + 1) = 2$ for all $x \in R$. If $I_1 = \int_0^8 f(x)dx$ and $I_2 = \int_{-1}^3 f(x)dx$, then the value of $I_1 + 2I_2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 16. · Key from source paper

Q199 JEE Main 2021 · 16 Mar · Shift 2 MCQ

Consider the integral $I = \int_0^{10} \frac{[x]e^{[x]}}{e^{x-1}}\,dx$ where $[x]$ denotes the greatest integer less than or equal to x. Then the value of I is equal to :

(A) $9(e - 1)$
(B) $45(e + 1)$
(C) $45(e - 1)$
(D) $9(e + 1)$

Answer: (C) $45(e - 1)$ · Key from source paper

Q200 JEE Main 2021 · 26 Feb · Shift 1 MCQ

The value of $\sum_{n=1}^{100} \int_{n-1}^{n} e^{x-[x]}\,dx$, where $[x]$ is the greatest integer $\leq x$, is:

(A) $100(e-1)$
(B) $100e$
(C) $100(1-e)$
(D) $100(1+e)$

Answer: (A) $100(e-1)$ · Key from source paper

Q201 JEE Main 2021 · 26 Feb · Shift 1 MCQ

The value of $\int_{-\pi/2}^{\pi/2} \frac{\cos^2 x}{1+3^x}\,dx$ is:

(A) $\frac{\pi}{2}$
(B) $\frac{\pi}{4}$
(C) 2π
(D) 4π

Answer: (B) $\frac{\pi}{4}$ · Key from source paper

Q202 JEE Main 2021 · 26 Feb · Shift 1 Numerical

The value of the integral $\int_0^{\pi} |\sin 2x|\,dx$ is _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q203 JEE Main 2021 · 26 Feb · Shift 2 MCQ

For $x > 0$, if $f(x) = \int_1^x \frac{\log_e t}{(1+t)}\,dt$, then $f(e) + f\left(\frac{1}{e}\right)$ is equal to

(A) 0
(B) $\frac{1}{2}$
(C) -1
(D) 1

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

Q204 JEE Main 2021 · 26 Feb · Shift 2 MCQ

Let $f(x) = \int_0^x e^t f(t)\,dt + e^x$ be a differentiable function for all $x \in R$. Then $f(x)$ equals :

(A) $e^{(e^x-1)}$

(B) $e^{e^x}-1$

(C) $2e^{e^x}-1$

(D) $2e^{(e^x-1)}-1$

Answer: (D) $2e^{(e^x-1)}-1$ · Key from source paper

Q205 JEE Main 2021 · 26 Feb · Shift 2 Numerical

If $I_{m,n}=\int_0^1 x^{m-1}(1-x)^{n-1}\,dx$, for $m,n\geq 1$, and $\int_0^1 \frac{x^{m-1}+x^{n-1}}{(1+x)^{m+n}}\,dx=\alpha I_{m,n}$, $\alpha\in R$, then α equals _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q206 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The value of $\int_{-1}^{1} x^2e^{[x^3]}dx$, where $[t]$ denotes the greatest integer $\leq t$, is :

(A) $\frac{e+1}{3}$

(B) $\frac{e-1}{3e}$

(C) $\frac{1}{3e}$

(D) $\frac{e+1}{3e}$

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

Q207 JEE Main 2021 · 25 Feb · Shift 2 MCQ

If $I_n=\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\cot^n x\,dx$, then

(A) $I_2+I_4, (I_3+I_5)^2, I_4+I_6$ are in G.P.

(B) $I_2+I_4, I_3+I_5, I_4+I_6$ are in A.P.

(C) $\frac{1}{I_2+I_4}, \frac{1}{I_3+I_5}, \frac{1}{I_4+I_6}$ are in A.P.

(D) $\frac{1}{I_2+I_4}, \frac{1}{I_3+I_5}, \frac{1}{I_4+I_6}$ are in G.P.

Answer: (C) $\frac{1}{I_2+I_4}, \frac{1}{I_3+I_5}, \frac{1}{I_4+I_6}$ are in A.P. · Key from source paper

Q208 JEE Main 2021 · 25 Feb · Shift 2 MCQ

$\lim_{n\to\infty}\left[\frac{1}{n}+\frac{n}{(n+1)^2}+\frac{n}{(n+2)^2}+\ldots+\frac{n}{(2n-1)^2}\right]$ is equal to

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

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

(C) $\frac{1}{3}$

(D) 1

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

Q209 JEE Main 2021 · 25 Feb · Shift 2 Numerical

The value of $\int_{-2}^{2} |3x^2 - 3x - 6| dx$ is

Numerical value type: the answer is a number.

Answer: 19. · Key from source paper

Q210 JEE Main 2021 · 24 Feb · Shift 1 Numerical

If $\int_{-a}^{a} x + x - 2\, dx = 22$, $a > 2$ and x denotes the greatest integer $\leq x$, then $\int_{a}^{-a} x + x\, dx$ is equal to

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q211 JEE Main 2021 · 24 Feb · Shift 2 MCQ

The value of the integral, $\int_{1}^{3} [x^2 - 2x - 2]\, dx$, where $[x]$ denotes the greatest integer less than or equal to x, is

(A) -4
(B) -5
(C) $-\sqrt{2} - \sqrt{3} + 1$
(D) $-\sqrt{2} - \sqrt{3} - 1$

Answer: (D) $-\sqrt{2} - \sqrt{3} - 1$ · Key from source paper

Q212 JEE Main 2021 · 24 Feb · Shift 2 MCQ

Let $f(x)$ be a differentiable function defined on $[0,\ 2]$ such that $f'(x) = f'(2 - x)$ for all $x \in (0, 2)$, $f(0) = 1$ and $f(2) = e^2$. Then the value of $\int_{0}^{2} f(x) dx$ is

(A) $2(1 + e^2)$
(B) $1 + e^2$
(C) $1 - e^2$
(D) $2(1 - e^2)$

Answer: (B) $1 + e^2$ · Key from source paper

Q213 JEE Main 2020 · 6 Sep · Shift 1 MCQ

If $I_1 = \int_{0}^{1} \left(1 - x^{50}\right)^{100} dx$ and $I_2 = \int_{0}^{1} \left(1 - x^{50}\right)^{101} dx$ such that $I_2 = \alpha I_1$ then α equals to :

(A) $\frac{5049}{5050}$
(B) $\frac{5050}{5049}$
(C) $\frac{5050}{5051}$
(D) $\frac{5051}{5050}$

Answer: (C) $\frac{5050}{5051}$ · Key from source paper

Q214 JEE Main 2020 · 5 Sep · Shift 1 MCQ

The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{1}{1+e^{\sin x}}dx$ is :

(A) $\frac{\pi}{4}$
(B) π
(C) $\frac{\pi}{2}$
(D) $\frac{3\pi}{2}$

Answer: (C) $\frac{\pi}{2}$ · Key from source paper

Q215 JEE Main 2020 · 4 Sep · Shift 1 MCQ

Let $f(x) = \int \frac{\sqrt{x}}{(1+x)^2}dx \ \ (x \geq 0)$. Then $f(3) - f(1)$ is equal to :

(A) $-\frac{\pi}{12} + \frac{1}{2} + \frac{\sqrt{3}}{4}$
(B) $\frac{\pi}{6} + \frac{1}{2} - \frac{\sqrt{3}}{4}$
(C) $-\frac{\pi}{6} + \frac{1}{2} + \frac{\sqrt{3}}{4}$
(D) $\frac{\pi}{12} + \frac{1}{2} - \frac{\sqrt{3}}{4}$

Answer: (D) $\frac{\pi}{12} + \frac{1}{2} - \frac{\sqrt{3}}{4}$ · Key from source paper

Q216 JEE Main 2020 · 4 Sep · Shift 1 MCQ

Let $f(x) = |x-2|$ and $g(x) = f(f(x))$, $x \in [0,4]$. Then $\int_0^3 (g(x) - f(x))\,dx$ is equal to

(A) 1
(B) 0
(C) $\frac{1}{2}$
(D) $\frac{3}{2}$

Answer: (A) 1 · Key from source paper

Q217 JEE Main 2020 · 4 Sep · Shift 2 MCQ

The integral $\int_{\pi/6}^{\pi/3} \tan^3 x \cdot \sin^2 3x \left(2\sec^2 x \cdot \sin^2 3x + 3\tan x \cdot \sin 6x\right) dx$ is equal to:

(A) $\frac{7}{18}$
(B) $-\frac{1}{9}$
(C) $-\frac{1}{18}$
(D) $\frac{9}{2}$

Answer: (C) $-\frac{1}{18}$ · Key from source paper

Q218 JEE Main 2020 · 4 Sep · Shift 2 Numerical

Let $\{x\}$ and $[x]$ denote the fractional part of x and the greatest integer $\leq x$ respectively of a real number x. if $\int_0^n \{x\}dx$, $\int_0^n [x]dx$ and $10(n^2-n)$, $(n \in N, n > 1)$ are three consecutive terms of a G.P.

then n is equal to _____

Numerical value type: the answer is a number.

Answer: 21. · Key from source paper

Q219 JEE Main 2020 · 3 Sep · Shift 1 MCQ

$\int_{-\pi}^{\pi} |\pi - |x||dx$ is equal to

(A) $\sqrt{2\pi^2}$

(B) $2\pi^2$

(C) π^2

(D) $\frac{\pi^2}{2}$

Answer: (C) π^2 · Key from source paper

Q220 JEE Main 2020 · 3 Sep · Shift 2 MCQ

If the value of the integral $\int_0^{\frac{1}{2}} \frac{x^2}{(1-x^2)^{\frac{3}{2}}}dx$ is $\frac{k}{6}$, then k is equal to:

(A) $2\sqrt{3} + \pi$

(B) $2\sqrt{3} - \pi$

(C) $3\sqrt{2} + \pi$

(D) $3\sqrt{2} - \pi$

Answer: (B) $2\sqrt{3} - \pi$ · Key from source paper

Q221 JEE Main 2020 · 2 Sep · Shift 1 Numerical

The integral $\int_0^2 ||x-1| - x|\, dx$ is equal to

Numerical value type: the answer is a number.

Answer: 1.5. · Key from source paper

Q222 JEE Main 2020 · 2 Sep · Shift 2 Numerical

Let $[t]$ denote the greatest integer less than or equal to t. Then the value of $\int_1^2 |2x - [3x]|dx$ is

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q223 JEE Main 2020 · 9 Jan · Shift 1 MCQ

If for all real triplets (a, b, c), $f(x) = a + bx + cx^2$; then $\int_0^1 f(x)dx$ is equal to:

(A) $2\left\{3f(1)+2f\left(\frac{1}{2}\right)\right\}$
(B) $\frac{1}{2}\left\{f(1)+3f\left(\frac{1}{2}\right)\right\}$
(C) $\frac{1}{3}\left\{f(0)+f\left(\frac{1}{2}\right)\right\}$
(D) $\frac{1}{6}\left\{f(0)+f(1)+4f\left(\frac{1}{2}\right)\right\}$

Answer: (D) $\frac{1}{6}\left\{f(0)+f(1)+4f\left(\frac{1}{2}\right)\right\}$ · Key from source paper

Q224 JEE Main 2020 · 9 Jan · Shift 1 MCQ

The value of $\int_0^{2\pi} \frac{x\sin^8 x}{\sin^8 x+\cos^8 x}dx$ is equal to:

(A) 2π
(B) $2\pi^2$
(C) π^2
(D) 4π

Answer: (C) π^2 · Key from source paper

Q225 JEE Main 2020 · 8 Jan · Shift 2 MCQ

If $I=\int_1^2 \frac{dx}{\sqrt{2x^3-9x^2+12x+4}}$, then

(A) $\frac{1}{8}<I^2<\frac{1}{4}$
(B) $\frac{1}{9}<I^2<\frac{1}{8}$
(C) $\frac{1}{16}<I^2<\frac{1}{9}$
(D) $\frac{1}{6}<I^2<\frac{1}{2}$

Answer: (B) $\frac{1}{9}<I^2<\frac{1}{8}$ · Key from source paper

Q226 JEE Main 2020 · 7 Jan · Shift 1 MCQ

If $f(a+b+1-x)=f(x)$, for all x, where a and b are fixed positive real numbers, then $\frac{1}{a+b}\int_a^b x(f(x)+f(x+1))dx$ is equal to

(A) $\int_{a-1}^{b-1} f(x+1)dx$
(B) $\int_{a-1}^{b-1} f(x)dx$
(C) $\int_{a+1}^{b+1} f(x)dx$
(D) $\int_{a+1}^{b+1} f(x+1)dx$

Options (1) or (3) were accepted. More than one answer was accepted. · Key from source paper

Q227 JEE Main 2020 · 7 Jan · Shift 2 MCQ

The value of α for which $4\alpha\int_{-1}^{2} e^{-\alpha|x|}dx=5$, is

(A) $\log_e 2$
(B) $\log_e \left(\frac{3}{2}\right)$
(C) $\log_e \sqrt{2}$
(D) $\log_e \left(\frac{4}{3}\right)$

Answer: (A) $\log_e 2$ · Key from source paper

Q228 JEE Main 2019 · 12 Apr · Shift 1 MCQ

Let $f : R \to R$ be a continuous and differentiable function such that $f2 = 6$ and $f'2 = \frac{1}{48}$. If $\int_6^{f(x)} 4t^3 dt = x - 2gx$, then $\lim_{x\to 2} gx$ is equal to

(A) 24
(B) 18
(C) 12
(D) 36

Answer: (B) 18 · Key from source paper

Q229 JEE Main 2019 · 12 Apr · Shift 1 MCQ

If $\int_0^{\frac{\pi}{2}} \frac{\cot x}{\cot x + \operatorname{cosec} x} dx = m(\pi + n)$, then mn is equal to

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

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

Q230 JEE Main 2019 · 12 Apr · Shift 2 MCQ

A value of α such that $\int_\alpha^{\alpha+1} \frac{dx}{(x+\alpha)(x+\alpha+1)} = \log_e \left(\frac{9}{8}\right)$ is

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

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

Q231 JEE Main 2019 · 10 Apr · Shift 1 MCQ

The value of $\int_0^{2\pi} [\sin 2x(1 + \cos 3x)]dx$, where $[t]$ denotes the greatest integer function is

(A) π

(B) 2π

(C) $-\pi$

(D) -2π

Answer: (C) $-\pi$ · Key from source paper

Q232 JEE Main 2019 · 10 Apr · Shift 1 MCQ

$\lim_{n\to\infty}\left(\frac{(n+1)^{1/3}}{n^{4/3}}+\frac{(n+2)^{1/3}}{n^{4/3}}+\ldots\ldots+\frac{(2n)^{1/3}}{n^{4/3}}\right)$ is equal to

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

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

(C) $\frac{4}{3}(2)^{4/3}$

(D) $\frac{3}{4}(2)^{4/3}-\frac{4}{3}$

Answer: (A) $\frac{3}{4}(2)^{4/3}-\frac{3}{4}$ · Key from source paper

Q233 JEE Main 2019 · 10 Apr · Shift 2 MCQ

The integral $\int_{\pi/6}^{\pi/3}\sec^{\frac{2}{3}}x\cdot\operatorname{cosec}^{\frac{4}{3}}x\,dx$ is equal to

(A) $3^{\frac{7}{6}}-3^{\frac{5}{6}}$

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

(C) $3^{\frac{5}{6}}-3^{\frac{2}{3}}$

(D) $3^{\frac{5}{3}}-3^{\frac{1}{3}}$

Answer: (A) $3^{\frac{7}{6}}-3^{\frac{5}{6}}$ · Key from source paper

Q234 JEE Main 2019 · 9 Apr · Shift 1 MCQ

The value of $\int_0^{\pi/2}\dfrac{\sin^3 x}{\sin x+\cos x}dx$ is:

(A) $\dfrac{\pi-1}{2}$

(B) $\dfrac{\pi-2}{8}$

(C) $\dfrac{\pi-1}{4}$

(D) $\dfrac{\pi-2}{4}$

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

Q235 JEE Main 2019 · 9 Apr · Shift 2 MCQ

The value of the integral $\int_0^1 x\cot^{-1}\left(1-x^2+x^4\right)dx$ is

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

Answer: (A) $\frac{\pi}{4} - \frac{1}{2}\log_e 2$ · Key from source paper

---

Q236 JEE Main 2019 · 9 Apr · Shift 2 MCQ

If $f : R \to R$ is a differentiable function and $f(2) = 6$, then $\lim_{x\to 2} \int_6^{f(x)} \frac{2t\,dt}{(x-2)}$ is:

(A) 0
(B) $2f'(2)$
(C) $24f'(2)$
(D) $12f'(2)$

Answer: (D) $12f'(2)$ · Key from source paper

Q237 JEE Main 2019 · 8 Apr · Shift 1 MCQ

If $fx = \frac{2 - x\cos x}{2 + x\cos x}$ and $g(x) = \log_e x$, then the value of the integral $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} gfx\,dx$ is

(A) $\log_e e$
(B) $\log_e 2$
(C) $\log_e 1$
(D) $\log_e 3$

Answer: (C) $\log_e 1$ · Key from source paper

Q238 JEE Main 2019 · 8 Apr · Shift 2 MCQ

Let $fx = \int_0^x gtdt$, where g is a non-zero even function. If $fx + 5 = gx$, then $\int_0^x f(t)\,dt$ equals

(A) $\int_5^{x+5} g(t)\,dt$
(B) $\int_{x+5}^5 g(t)\,dt$
(C) $5\int_{x+5}^5 g(t)\,dt$
(D) $2\int_5^{x+5} g(t)\,dt$

Answer: (B) $\int_{x+5}^5 g(t)\,dt$ · Key from source paper

Q239 JEE Main 2019 · 12 Jan · Shift 1 MCQ

Let f and g be continuous functions on $[0, a]$ such that $f(x) = f(a - x)$ and $g(x) + g(a - x) = 4$, then $\int_0^a f(x)g(x)dx$ is equal to

(A) $\int_0^a f(x)dx$
(B) $-3\int_0^a f(x)dx$
(C) $4\int_0^a f(x)dx$
(D) $2\int_0^a f(x)dx$

Answer: (D) $2\int_0^a f(x)dx$ · Key from source paper

Q240 JEE Main 2019 · 12 Jan · Shift 2 MCQ

The integral $\int_1^e \left\{\left(\frac{x}{e}\right)^{2x} - \left(\frac{e}{x}\right)^{x}\right\} \log_e x \, dx$ is equal to

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

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

Q241 JEE Main 2019 · 12 Jan · Shift 2 MCQ

$\lim_{n\to\infty}\left(\frac{n}{n^2+1^2} + \frac{n}{n^2+2^2} + \frac{n}{n^2+3^2} + \ldots + \frac{1}{5n}\right)$ is equal to

(A) $\frac{\pi}{4}$
(B) $\tan^{-1}(2)$
(C) $\frac{\pi}{2}$
(D) $\tan^{-1}(3)$

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

Q242 JEE Main 2019 · 11 Jan · Shift 1 MCQ

The value of the integral $\int_{-2}^{2} \frac{\sin^2 x}{\left[\frac{x}{\pi}\right]+\frac{1}{2}}dx$ (where $[x]$ denotes the greatest integer less than or equal to x) is

(A) 0
(B) sin 4
(C) 4
(D) 4 − sin 4

Answer: (A) 0 · Key from source paper

Q243 JEE Main 2019 · 11 Jan · Shift 2 MCQ

The integral $\int_{\pi/6}^{\pi/4} \frac{dx}{\sin 2x(\tan^5 x + \cot^5 x)}$ equals:

(A) $\frac{1}{20}\tan^{-1}\left(\frac{1}{9\sqrt{3}}\right)$
(B) $\frac{1}{10}\left(\frac{\pi}{4}-\tan^{-1}\left(\frac{1}{9\sqrt{3}}\right)\right)$
(C) $\frac{\pi}{40}$
(D) $\frac{1}{5}\left(\frac{\pi}{4}-\tan^{-1}\left(\frac{1}{3\sqrt{3}}\right)\right)$

Answer: (B) $\frac{1}{10}\left(\frac{\pi}{4}-\tan^{-1}\left(\frac{1}{9\sqrt{3}}\right)\right)$ · Key from source paper

---

Q244 JEE Main 2019 · 10 Jan · Shift 1 MCQ

Let $I=\int_a^b(x^4-2x^2)dx$. If I is minimum then the ordered pair $(a,\ b)$ is

(A) $(0,\ \sqrt{2})$
(B) $(\sqrt{2},\ -\sqrt{2})$
(C) $(-\sqrt{2},\ 0)$
(D) $(-\sqrt{2},\ \sqrt{2})$

Answer: (D) $(-\sqrt{2},\ \sqrt{2})$ · Key from source paper

Q245 JEE Main 2019 · 10 Jan · Shift 2 MCQ

The value of $\int_{-\pi/2}^{\pi/2}\frac{dx}{[x]+[\sin x]+4}$, where $[t]$ denotes the greatest integer less than or equal to t, is

(A) $\frac{3}{20}(4\pi-3)$
(B) $\frac{3}{10}(4\pi-3)$
(C) $\frac{1}{12}(7\pi-5)$
(D) $\frac{1}{12}(7\pi+5)$

Answer: (A) $\frac{3}{20}(4\pi-3)$ · Key from source paper

Q246 JEE Main 2019 · 10 Jan · Shift 2 MCQ

If $\int_0^x f(t)dt=x^2+\int_x^1 t^2f(t)dt$, then $f'\left(\frac{1}{2}\right)$ is

(A) $\frac{18}{25}$
(B) $\frac{24}{25}$
(C) $\frac{4}{5}$
(D) $\frac{6}{25}$

Answer: (B) $\frac{24}{25}$ · Key from source paper

Q247 JEE Main 2019 · 9 Jan · Shift 1 MCQ

The value of $\int_0^{\pi} \cos x^3 dx$ is

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

(B) 0

(C) $\frac{4}{3}$

(D) $-\frac{4}{3}$

Options (3) or (2) were accepted. More than one answer was accepted. · Key from source paper

Q248 JEE Main 2019 · 9 Jan · Shift 2 MCQ

If $\int_0^{\pi/3} \frac{\tan\theta}{\sqrt{2k\sec\theta}} d\theta = 1 - \frac{1}{\sqrt{2}}$, $(k > 0)$, then the value of k is

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

(B) 1

(C) 2

(D) 4

Answer: (C) 2 · Key from source paper

Q249 JEE Main 2018 · 16 Apr · Online MCQ

If $f(x) = \int_0^x t(\sin x - \sin t)dt$, then

(A) $f'''(x) - f''(x) = \cos x - 2x\sin x$

(B) $f'''(x) + f''(x) - f'(x) = \cos x$

(C) $f'''(x) + f''(x) = \sin x$

(D) $f'''(x) + f'(x) = \cos x - 2x\sin x$

Answer: (D) $f'''(x) + f'(x) = \cos x - 2x\sin x$ · Key from source paper

Q250 JEE Main 2018 · 15 Apr · Shift 1 MCQ

The value of the integral
$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^4 x \left(1 + \log\left(\frac{2+\sin x}{2-\sin x}\right)\right) dx$ is

(A) $\frac{3}{16}\pi$

(B) 0

(C) $\frac{3}{8}\pi$

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

Answer: (C) $\frac{3}{8}\pi$ · Key from source paper

EdLoop JEE

Q251 JEE Main 2018 · 15 Apr · Shift 2 MCQ

The value of integral $\int_{\pi/4}^{3\pi/4} \frac{x}{1+\sin x}dx$ is

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

Answer: (B) $\pi(\sqrt{2}-1)$ · Checked by our team

Q252 JEE Main 2018 · 15 Apr · Shift 2 MCQ

If $I_1 = \int_0^1 e^{-x}\cos^2 x\,dx;\ I_2 = \int_0^1 e^{-x^2}\cos^2 x\,dx$ and $I_3 = \int_0^1 e^{-x^3}dx$; then

(A) $I_2 > I_3 > I_1$
(B) $I_3 > I_1 > I_2$
(C) $I_2 > I_1 > I_3$
(D) $I_3 > I_2 > I_1$

Answer: (D) $I_3 > I_2 > I_1$ · Key from source paper

Q253 JEE Main 2018 · 8 Apr · Offline MCQ

The values of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\sin^2 x}{1+2^x}\,dx$ is

(A) $\frac{\pi}{4}$
(B) $\frac{\pi}{8}$
(C) $\frac{\pi}{2}$
(D) 4π

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

Q254 JEE Main 2017 · 9 Apr · Online MCQ

If $\lim_{n\to\infty}\left(\frac{1^a+2^a+\ldots+n^a}{(n+1)^{a-1}[(na+1)+(na+2)+\ldots+(na+n)]}\right) = \frac{1}{60}$ for some positive real number a, then a is equal to

(A) $\frac{17}{2}$
(B) $\frac{15}{2}$
(C) 7
(D) 8

Answer: (C) 7 · Key from source paper

Q255 JEE Main 2017 · 8 Apr · Online MCQ

The integral $\int_{\pi/12}^{\pi/4} \frac{8\cos 2x}{(\tan x+\cot x)^3}\,dx$ equals

(A) $\frac{13}{256}$
(B) $\frac{15}{64}$
(C) $\frac{13}{32}$
(D) $\frac{15}{128}$

Answer: (D) $\frac{15}{128}$ · Key from source paper

Q256 JEE Main 2017 · 2 Apr · Offline MCQ

The integral $\int_{\pi/4}^{3\pi/4} \frac{dx}{1+\cos x}$ is equal to

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

Answer: (B) 2 · Key from source paper

Q257 JEE Main 2016 · 10 Apr · Online MCQ

For $x \in R,\ x \neq 0$, if $y(x)$ is a differentiable function such that $x\int_1^x y(t)dt = (x+1)\int_1^x ty(t)dt$, then $y(x)$ equals (where C is a constant)

(A) $Cx^3\,e^{\frac{1}{x}}$
(B) $\frac{C}{x^2}\,e^{-\frac{1}{x}}$
(C) $\frac{C}{x}\,e^{-\frac{1}{x}}$
(D) $\frac{C}{x^3}\,e^{-\frac{1}{x}}$

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

Q258 JEE Main 2016 · 10 Apr · Online MCQ

The value of the integral $\int_4^{10} \frac{[x^2]}{[x^2-28x+196]+[x^2]}dx$, where $[x]$ denotes the greatest integer less than or equal to x, is

(A) $\frac{1}{3}$
(B) 6
(C) 7
(D) 3

Answer: (D) 3 · Key from source paper

Q259 JEE Main 2016 · 9 Apr · Online · MCQ

If $2\int_0^1 \tan^{-1} x\,dx = \int_0^1 \cot^{-1}(1-x+x^2)\,dx$, then $\int_0^1 \tan^{-1}(1-x+x^2)\,dx$ is equal to

(A) $\frac{\pi}{2} + \ln 2$
(B) $\ln 2$
(C) $\frac{\pi}{2} - \ln 4$
(D) $\ln 4$

Answer: (B) $\ln 2$ · Key from source paper

Q260 JEE Main 2016 · 3 Apr · Offline · MCQ

$\lim_{n\to\infty} \left(\frac{(n+1)\,(n+2)\ldots 3n}{n^{2n}}\right)^{\frac{1}{n}}$ is equal to

(A) $\frac{9}{e^2}$
(B) $3\log 3 - 2$
(C) $\frac{18}{e^4}$
(D) $\frac{27}{e^2}$

Answer: (D) $\frac{27}{e^2}$ · Key from source paper

Q261 JEE Main 2015 · 11 Apr · Online · MCQ

Let $f : R \to R$ be a function such that $f(2-x) = f(2+x)$ and $f(4-x) = f(4+x)$, for all $x \in R$ and $\int_0^2 f(x)dx = 5$. Then the value of $\int_{10}^{50} f(x)dx$ is

(A) 100
(B) 125
(C) 80
(D) 200

Answer: (A) 100 · Key from source paper

Q262 JEE Main 2015 · 11 Apr · Online · MCQ

Let $f : (-1,\ 1) \to R$ be a continuous function. If $\int_0^{\sin x} f(t)\,dt = \frac{\sqrt{3}}{2}x$, then $f\left(\frac{\sqrt{3}}{2}\right)$ is equal to:

(A) $\frac{\sqrt{3}}{2}$
(B) $\sqrt{3}$
(C) $\frac{1}{2}$
(D) $\sqrt{\frac{3}{2}}$

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

Q263 JEE Main 2015 · 10 Apr · Online · MCQ

For $x > 0$, let $f(x) = \int_1^x \frac{\log t}{1+t}\,dt$. Then $f(x) + f\left(\frac{1}{x}\right)$ is equal to

(A) $\frac{1}{2}(\log x)^2$
(B) $\log x$
(C) $\frac{1}{4}\log x^2$
(D) $\frac{1}{4}(\log x)^2$

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

Q264 JEE Main 2015 · 4 Apr · Offline MCQ

The integral $\int_2^4 \frac{\log x^2}{\log x^2 + \log(6-x)^2}\,dx$ is equal to

(A) 6
(B) 2
(C) 4
(D) 1

Answer: (D) 1 · Key from source paper

Q265 JEE Main 2014 · 19 Apr · Online MCQ

Let, the function F be defined as $F(x) = \int_1^x \frac{e^t}{t}dt$, $x > 0$, then the value of the integral $\int_1^x \frac{e^t}{t+a}dt$, where $a > 0$, is

(A) $e^a[F(x) - F(1+a)]$
(B) $e^{-a}[F(x+a) - F(a)]$
(C) $e^a[F(x+a) - F(1+a)]$
(D) $e^{-a}[F(x+a) - F(1+a)]$

Answer: (D) $e^{-a}[F(x+a) - F(1+a)]$ · Key from source paper

---

Q266 JEE Main 2014 · 12 Apr · Online MCQ

If [ ] denotes the greatest integer function, then the integral $\int_0^{\pi}[\cos x\,dx$ is equal to:

(A) $\frac{\pi}{2}$
(B) 0
(C) -1
(D) $-\frac{\pi}{2}$

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

Q267 JEE Main 2014 · 12 Apr · Online MCQ

If for a continuous function f(x), $\int_{-\pi}^{t}(f(x) + x\,dx) = \pi^2 - t^2$, for all $t \geq -\pi$, then f $\left(-\frac{\pi}{3}\right)$ is equal to:

(A) π
(B) $\frac{\pi}{2}$
(C) $\frac{\pi}{3}$
(D) $\frac{\pi}{6}$

Answer: (A) π · Key from source paper

Q268 JEE Main 2014 · 11 Apr · Online MCQ

If for $n \geq 1, P_n = \int_1^e (\log x^n) dx$, then $P_{10} - 90P_8$ is equal to:

(A) -9
(B) $10e$
(C) $-9e$
(D) 10

Answer: (C) $-9e$ · Key from source paper

Q269 JEE Main 2014 · 9 Apr · Online MCQ

The integral $\int_0^{\frac{1}{2}} \frac{\ln(1+2x)}{1+4x^2} dx$ equals

(A) $\frac{\pi}{4} \ln 2$
(B) $\frac{\pi}{16} \ln 2$
(C) $\frac{\pi}{8} \ln 2$
(D) $\frac{\pi}{32} \ln 2$

Answer: (B) $\frac{\pi}{16} \ln 2$ · Key from source paper

Q270 JEE Main 2014 · 6 Apr · Offline MCQ

The integral $\int_0^{\pi} \sqrt{1 + 4\sin^2 \frac{x}{2} - 4\sin \frac{x}{2}} dx$ equals

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

Answer: (B) $4\sqrt{3} - 4 - \frac{\pi}{3}$ · Key from source paper

---

Q271 JEE Main 2013 · 25 Apr · Online MCQ

For $0 \leq x \leq \frac{\pi}{2}$, the value of $\int_0^{\sin^2 x} \sin^{-1}(\sqrt{t}) dt + \int_0^{\cos^2 x} \cos^{-1}(\sqrt{t}) dt$ equals :

(A) $\frac{\pi}{4}$
(B) 0
(C) 1
(D) $-\frac{\pi}{4}$

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

Q272 JEE Main 2013 · 25 Apr · Online MCQ

Let $f:[-2,3]\to[0,\infty)$ be a continuous function such that $f(1-x)=f(x)$ for all $x\in[-2,3]$. If R_1 is the numerical value of the area of the region bounded by $y=f(x), x=-2, x=3$ and the axis of x and $\mathrm{R}_2=\int_{-2}^{3} xf(x)dx$, then :

(A) $3\mathrm{R}_1=2\mathrm{R}_2$
(B) $2\mathrm{R}_1=3\mathrm{R}_2$
(C) $\mathrm{R}_1=\mathrm{R}_2$
(D) $\mathrm{R}_1=2\mathrm{R}_2$

Answer: (D) $\mathrm{R}_1=2\mathrm{R}_2$ · Key from source paper

Q273 JEE Main 2013 · 23 Apr · Online MCQ

The value of $\int_{-\pi/2}^{\pi/2}\frac{\sin^2 x}{1+2^x}\,dx$ is :

(A) π
(B) $\frac{\pi}{2}$
(C) 4π
(D) $\frac{\pi}{4}$

Answer: (D) $\frac{\pi}{4}$ · Key from source paper

Q274 JEE Main 2013 · 22 Apr · Online MCQ

The integral $\int_{7\pi/4}^{7\pi/3}\sqrt{\tan^2 x}dx$ is equal to :

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

Answer: (A) $\log 2\sqrt{2}$ · Checked by our team

Q275 JEE Main 2013 · 7 Apr · Offline MCQ

Statement - I : The value of the integral $\int_{\pi/6}^{\pi/3}\frac{dx}{1+\sqrt{\tan x}}$ is equal to $\frac{\pi}{6}$.
Statement - II : $\int_a^b f(x)dx=\int_a^b f(a+b-x)dx$.

(A) Statement - I is true; Statement - II is false.
(B) Statement - I is false; Statement - II is true.
(C) Statement - I true; Statement - II is true; Statement - II is a correct explanation for Statement - I.
(D) Statement - I is true; Statement - II is true; Statement - II is not a correct explanation for Statement - I.

Answer: (B) Statement - I is false; Statement - II is true. · Key from source paper

---

Q276 JEE Main 2013 · 7 Apr · Offline MCQ

At present, a firm is manufacturing 2000 items. It is estimated that the rate of change of production P w.r.t. additional number of workers x is given by $\frac{dP}{dx} = 100 - 12\sqrt{x}$. If the firm employs 25 more workers, then the new level of production of items is

(A) 3500
(B) 4500
(C) 2500
(D) 3000

Answer: (A) 3500 · Key from source paper

Q277 AIEEE 2012 · 26 May · Online MCQ

If $[x]$ is the greatest integer $\leq x$, then the value of the integral $\int_{-0.9}^{0.9} \left([x^2] + \log\left(\frac{2-x}{2+x}\right)\right) dx$ is

(A) 0.486
(B) 0.243
(C) 1.8
(D) 0

Answer: (D) 0 · Key from source paper

Q278 AIEEE 2012 · 19 May · Online MCQ

The value of the integral $\int_0^{0.9} [x - 2[x]] dx$, where [.] denotes the greatest integer function is

(A) 0.9
(B) 1.8
(C) -0.9
(D) 0

Answer: (D) 0 · Key from source paper

Q279 AIEEE 2012 · 12 May · Online MCQ

If $\frac{d}{dx}G(x) = \frac{e^{\tan x}}{x}$, $x \in (0, \pi/2)$, then $\int_{1/4}^{1/2} \frac{2}{x} \cdot e^{\tan(\pi x^2)}\, dx$ is equal to

(A) $G(\pi/4) - G(\pi/16)$
(B) $2[G(\pi/4) - G(\pi/16)]$
(C) $\pi[G(1/2) - G(1/4)]$
(D) $G(1/\sqrt{2}) - G(1/2)$

Answer: (A) $G(\pi/4) - G(\pi/16)$ · Key from source paper

Q280 AIEEE 2012 · 7 May · Online MCQ

If $\int_e^x tf(t)dt = \sin x - x\cos x - \frac{x^2}{2}$, for all $x \in R - \{0\}$, then the value of $f\left(\frac{\pi}{6}\right)$ is

(A) 1/2
(B) 1
(C) 0
(D) $-1/2$

Answer: (D) $-1/2$ · Key from source paper

Q281 AIEEE 2011 MCQ

The value of $\int_0^1 \frac{8\log(1+x)}{1+x^2}dx$ is

(A) $\frac{\pi}{8}\log 2$
(B) $\frac{\pi}{2}\log 2$
(C) $\log 2$
(D) $\pi \log 2$

Answer: (D) $\pi \log 2$ · Key from source paper

Q282 AIEEE 2010 MCQ

Let $p(x)$ be a function defined on R such that $p'(x) = p'(1-x)$, for all $x \in [0,1]$, $p(0) = 1$ and $p(1) = 41$. Then $\int_0^1 p(x)\,dx$ equals

(A) 21
(B) 41
(C) 42
(D) $\sqrt{41}$

Answer: (A) 21 · Key from source paper

Q283 AIEEE 2009 MCQ

$\int_0^{\pi} [\cot x]\,dx$, $[\bullet]$ denotes the greatest integer function, is equal to

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

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

Q284 AIEEE 2008 MCQ

Let $\mathrm{I}=\int_0^1 \frac{\sin \mathrm{x}}{\sqrt{\mathrm{x}}}\,\mathrm{dx}$ and $\mathrm{J}=\int_0^1 \frac{\cos \mathrm{x}}{\sqrt{\mathrm{x}}}\,\mathrm{dx}$. Then which one of the following is true?

(A) $\mathrm{I}>\frac{2}{3}$ and $\mathrm{J}>2$
(B) $I<\frac{2}{3}$ and $J<2$
(C) $\mathrm{I}<\frac{2}{3}$ and $\mathrm{J}>2$
(D) $I>\frac{2}{3}$ and $J<2$

Answer: (B) $I<\frac{2}{3}$ and $J<2$ · Key from source paper

Q285 AIEEE 2007 MCQ

Let $F(x)=f(x)+f\left(\frac{1}{x}\right)$, where $f(x)=\int_1^x \frac{\log t}{1+t}dt$. Then $F(e)$ equals

(A) $\frac{1}{2}$
(B) 0
(C) 1
(D) 2

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

Q286 AIEEE 2007 MCQ

The solution for x of the equation $\int_{\sqrt{2}}^{x} \frac{dt}{t\sqrt{t^2-1}}=\frac{\pi}{2}$ is

(A) 2
(B) π
(C) $\frac{\sqrt{3}}{2}$
(D) None of these

Answer: (D) None of these · Key from source paper

Q287 AIEEE 2006 MCQ

The value of the integral, $\int_3^6 \frac{\sqrt{x}}{\sqrt{9-x}+\sqrt{x}}\,dx$ is

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

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

Q288 AIEEE 2006 MCQ

$\int_0^{\pi} x f(\sin x)\,dx$ is equal to

(A) $\pi \int_0^{\pi} f(\cos x)\,dx$
(B) $\pi \int_0^{\pi} f(\sin x)\,dx$
(C) $\frac{\pi}{2} \int_0^{\pi/2} f(\sin x)\,dx$
(D) $\pi \int_0^{\pi/2} f(\cos x)\,dx$

Answer: (D) $\pi \int_0^{\pi/2} f(\cos x)\,dx$ · Key from source paper

Q289 AIEEE 2006 MCQ

$\int_{-3\pi/2}^{-\pi/2} \left[(x+\pi)^3 + \cos^2(x+3\pi)\right] dx$ is equal to

(A) $\frac{\pi^4}{32}$
(B) $\frac{\pi^4}{32} + \frac{\pi}{2}$
(C) $\frac{\pi}{2}$
(D) $\frac{\pi}{4} - 1$

Answer: (C) $\frac{\pi}{2}$ · Key from source paper

Q290 AIEEE 2006 MCQ

The value of $\int_1^a [x] f'(x)\,dx$, $a > 1$, where $[x]$ denotes the greatest integer not exceeding x is

(A) $\mathrm{af}(a) - \{f(1) + f(2) + \ldots + f([a])\}$
(B) $[a]f(a) - \{f(1) + f(2) + \ldots + f([a])\}$
(C) $[a]f([a]) - \{f(1) + f(2) + \ldots + f(a)\}$
(D) $af([a]) - \{f(1) + f(2) + \ldots + f(a)\}$

Answer: (B) $[a]f(a) - \{f(1) + f(2) + \ldots + f([a])\}$ · Key from source paper

Q291 AIEEE 2005 MCQ

$\lim_{n\to\infty} \left[\frac{1}{n^2}\sec^2\frac{1}{n^2} + \frac{2}{n^2}\sec^2\frac{4}{n^2} + \ldots + \frac{1}{n^2}\sec^2 1\right]$ equals

(A) $\frac{1}{2}\sec 1$
(B) $\frac{1}{2}\operatorname{cosec} 1$
(C) $\tan 1$
(D) $\frac{1}{2}\tan 1$

Answer: (D) $\frac{1}{2}\tan 1$ · Key from source paper

Q292 AIEEE 2005 MCQ

If $\mathrm{I}_1 = \int_0^1 2^{x^2}\,dx,\ I_2 = \int_0^1 2^{x^3}\,dx,\ I_3 = \int_1^2 2^{x^2}\,dx$ and $I_4 = \int_1^2 2^{x^3}\,dx$ then

(A) $I_2 > I_1$
(B) $I_1 > I_2$
(C) $I_3 = I_4$
(D) $I_3 > I_4$

Answer: (B) $I_1 > I_2$ · Key from source paper

Q293 AIEEE 2005 MCQ

Let $f : R \to R$ be a differentiable function having $f(2) = 6,\ f'(2) = \left(\frac{1}{48}\right)$. Then $\lim_{x\to 2} \int_6^{f(x)} \frac{4t^3}{x-2}dt$ equals

(A) 24
(B) 36
(C) 12
(D) 18

Answer: (D) 18 · Key from source paper

Q294 AIEEE 2005 MCQ

The value of $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1+a^x}dx,\ a > 0$, is

(A) $a\pi$
(B) $\frac{\pi}{2}$
(C) $\frac{\pi}{a}$
(D) 2π

Answer: (B) $\frac{\pi}{2}$ · Key from source paper

Q295 AIEEE 2005 MCQ

Let $f(x)$ be a non-negative continuous function such that the area bounded by the curve $y = f(x)$, x -axis and the ordinates $x = \frac{\pi}{4}$ and $x = \beta > \frac{\pi}{4}$ is $\left(\beta \sin\beta + \frac{\pi}{4}\cos\beta + \sqrt{2}\beta\right)$. Then $f\left(\frac{\pi}{2}\right)$ is

(A) $\left(\frac{\pi}{4}+\sqrt{2}-1\right)$
(B) $\left(\frac{\pi}{4}-\sqrt{2}+1\right)$
(C) $\left(1-\frac{\pi}{4}-\sqrt{2}\right)$
(D) $\left(1-\frac{\pi}{4}+\sqrt{2}\right)$

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

Q296 AIEEE 2004 MCQ

$\lim_{n\to\infty}\sum_{r=1}^{n}\frac{1}{n}e^{\frac{r}{n}}$ is

(A) e
(B) $e-1$
(C) $1-e$
(D) $e+1$

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

Q297 AIEEE 2004 MCQ

The value of $\int_{-2}^{3}|1-x^2|dx$ is

(A) $\frac{28}{3}$
(B) $\frac{14}{3}$
(C) $\frac{7}{3}$
(D) $\frac{1}{3}$

Answer: (A) $\frac{28}{3}$ · Key from source paper

Q298 AIEEE 2004 MCQ

The value of $I=\int_{0}^{\pi/2}\frac{(\sin x+\cos x)^2}{\sqrt{1+\sin 2x}}dx$ is

(A) 0
(B) 1
(C) 2
(D) 3

Answer: (C) 2 · Key from source paper

Q299 AIEEE 2004 MCQ

If $\int_{0}^{\pi}xf(\sin x)dx=A\int_{0}^{\pi/2}f(\sin x)dx$, then A is

(A) 0

(B) π

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

(D) 2π

Answer: (B) π · Key from source paper

Q300 AIEEE 2004 MCQ

If $f(x)=\frac{e^x}{1+e^x}$, $I_1=\int_{f(-a)}^{f(a)} xg\{x(1-x)\}dx$ and $I_2=\int_{f(-a)}^{f(a)} g\{x(1-x)\}dx$ then the value of $\frac{I_2}{I_1}$ is

(A) 2

(B) -3

(C) -1

(D) 1

Answer: (A) 2 · Key from source paper

Q301 AIEEE 2003 MCQ

$\lim_{n\to\infty}\frac{1+2^4+3^4+\ldots n^4}{n^5}-\lim_{n\to\infty}\frac{1+2^3+3^3+\ldots n^3}{n^5}$

(A) $\frac{1}{5}$

(B) $\frac{1}{30}$

(C) Zero

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

Answer: (A) $\frac{1}{5}$ · Key from source paper

Q302 AIEEE 2003 MCQ

Let $\frac{d}{dx}F(x)=\left(\frac{e^{\sin x}}{x}\right)\ x>0$. If $\int_1^4\frac{3}{x}e^{\sin x^3}dx=F(k)-F(1)$ then one of the possible values of k, is

(A) 64

(B) 15

(C) 16

(D) 63

Answer: (A) 64 · Key from source paper

Q303 AIEEE 2003 MCQ

If $\mathrm{f(y)=e^y, g(y)=y; y>0}$ and $F(t)=\int_0^t \mathrm{f(t-y)g(y)}$, then

(A) $\mathrm{F(t)} = \mathrm{te}^{-t}$
(B) $\mathrm{F(t)} = 1 - \mathrm{te}^{-t}(1+t)$
(C) $\mathrm{F(t)} = \mathrm{e}^{t} - (1+t)$
(D) $\mathrm{F(t)} = \mathrm{te}^{t}$

Answer: (C) $\mathrm{F(t)} = \mathrm{e}^{t} - (1+t)$ · Key from source paper

Q304 AIEEE 2003 MCQ

Let $f(x)$ be a function satisfying $f'(x) = f(x)$ with $f(0) = 1$ and $g(x)$ be a function that satisfies $f(x) + g(x) = x^2$. Then the value of the integral $\int_0^1 f(x)g(x)dx$, is

(A) $\mathrm{e} + \frac{\mathrm{e}^2}{2} + \frac{5}{2}$
(B) $\mathrm{e} - \frac{\mathrm{e}^2}{2} - \frac{5}{2}$
(C) $\mathrm{e} + \frac{\mathrm{e}^2}{2} - \frac{3}{2}$
(D) $\mathrm{e} - \frac{\mathrm{e}^2}{2} - \frac{3}{2}$

Answer: (D) $\mathrm{e} - \frac{\mathrm{e}^2}{2} - \frac{3}{2}$ · Key from source paper

Q305 AIEEE 2003 MCQ

The value of the integral $I = \int_0^1 x(1-x)^n dx$ is

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

Answer: (D) $\frac{1}{n+1} - \frac{1}{n+2}$ · Key from source paper

Q306 AIEEE 2002 MCQ

$\lim_{n\to\infty} \frac{1^p + 2^p + 3^p + \ldots + n^p}{n^{p+1}}$ is

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

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

Q307 AIEEE 2002 MCQ

$\int_0^{10\pi} |\sin x| dx$ is

(A) 20
(B) 8
(C) 10
(D) 18

Answer: (A) 20 · Checked by our team

Q308 AIEEE 2002 MCQ

$I_n = \int_0^{\pi/4} \tan^n x dx$ then $\lim_{n\to\infty} n\left[I_n + I_{n-2}\right]$ equals

(A) 1/2
(B) 1
(C) ∞
(D) zero

Answer: (B) 1 · Key from source paper

Q309 AIEEE 2002 MCQ

$\int_0^{\sqrt{2}} [x^2] dx$ is

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

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

Q310 AIEEE 2002 MCQ

$\int_{-\pi}^{\pi} \frac{2x(1+\sin x)}{1+\cos^2 x} dx$ is

(A) $\frac{\pi^2}{4}$
(B) π^2
(C) zero
(D) $\frac{\pi}{2}$

Answer: (B) π^2 · Key from source paper

Q311 AIEEE 2002 MCQ

If $y = f(x)$ makes +ve intercept of 2 and 0 unit on x and y axes and encloses an area of 3/4 square unit with the axes then $\int_0^2 x f'(x) dx$ is

EdLoop JEE

(A) 3/2
(B) 1
(C) 5/4
(D) -3/4

Answer: (D) -3/4 · Key from source paper

EdLoop JEE