

MATHEMATICS · JEE MAIN

Indefinite Integration

Chapter-wise previous year questions, with answer key

54

PYQS

2020–2025

PAPERS

4

TOPICS

Standard Integrals

Integration by Substitution

Integration by Parts

Partial Fractions

- 1 Attempt each question on paper first. They're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser: tap “Step-by-step solution” under it.

Practise this chapter online with instant answer checking: prepwis.in/learn · No signup needed to browse

Answers follow NTA's final answer keys. Typing errors are possible, so check doubtful answers against the official key. Spotted a mistake? prepwis.in/feedback · Terms: prepwis.in/terms

Standard Integrals · 9 PYQs

Q1 JEE Main 2025 · 23 Jan · Shift 1

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

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

[Step-by-step solution ► prepwiser.in/questions/1N0iRy2EvM](https://www.prepwiser.in/questions/1N0iRy2EvM)

Q2 JEE Main 2024 · 6 Apr · Shift 2

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

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

[Step-by-step solution ► prepwiser.in/questions/XO-Ea38KgS](https://www.prepwiser.in/questions/XO-Ea38KgS)

Q3 JEE Main 2023 · 10 Apr · Shift 2

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

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

[Step-by-step solution ► prepwiser.in/questions/falJ8u7GbB](https://www.prepwiser.in/questions/falJ8u7GbB)

Q4 JEE Main 2023 · 8 Apr · Shift 2

The integral $\int \left[\left(\frac{x}{2} \right)^x + \left(\frac{2}{x} \right)^x \right] \ln \left(\frac{ex}{2} \right) dx$ is equal to :

- (A) $\left(\frac{x}{2} \right)^x + \left(\frac{2}{x} \right)^x + C$
(B) $\left(\frac{x}{2} \right)^x - \left(\frac{2}{x} \right)^x + C$
(C) $\left(\frac{x}{2} \right)^x \log_2 \left(\frac{2}{x} \right) + C$
(D) None

[Step-by-step solution ► prepwiser.in/questions/-9NYvaGTBW](https://www.prepwiser.in/questions/-9NYvaGTBW)

Q5 JEE Main 2023 · 29 Jan · Shift 2

Let f and g be the twice differentiable functions on $\mathbb{R}$ such that

$$f''(x) = g''(x) + 6x$$

$$f'(1) = 4g'(1) - 3 = 9$$

$$f(2) = 3g(2) = 12.$$

Then which of the following is NOT true?

- (A) $g(-2) - f(-2) = 20$
 (B) There exists $x_0 \in (1, 3/2)$ such that $f(x_0) = g(x_0)$
 (C) $|f'(x) - g'(x)| < 6 \Rightarrow -1 < x < 1$
 (D) If $-1 < x < 2$, then $|f(x) - g(x)| < 8$

Step-by-step solution ► [prepwisar.in/questions/dd6mKIzL_Q](https://www.prepwisar.in/questions/dd6mKIzL_Q)

Q6 JEE Main 2022 · 26 Jul · Shift 2

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

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

Step-by-step solution ► [prepwisar.in/questions/tHVI5eePFO](https://www.prepwisar.in/questions/tHVI5eePFO)

Q7 JEE Main 2022 · 27 Jun · Shift 1

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

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

Step-by-step solution ► [prepwisar.in/questions/V7kH4fk1oc](https://www.prepwisar.in/questions/V7kH4fk1oc)

Q8 JEE Main 2020 · 4 Sep · Shift 1

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

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

Step-by-step solution ► [prepwisar.in/questions/yIkU9NCRdg](https://www.prepwisar.in/questions/yIkU9NCRdg)

Q9 JEE Main 2020 · 9 Jan · Shift 1

If $f'(x) = \tan^{-1}(\sec x + \tan x)$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$,
and $f(0) = 0$, then $f(1)$ is equal to :

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

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

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

(D) $\frac{\pi+2}{4}$

[Step-by-step solution ► prepwiser.in/questions/fnoEjq8j4x](https://www.prepwiser.in/questions/fnoEjq8j4x)

Integration by Substitution · 34 PYQs

Q10 JEE Main 2025 · 7 Apr · Shift 2

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/MjYI3nx1WP](https://www.prepwiser.in/questions/MjYI3nx1WP)

Q11 JEE Main 2025 · 4 Apr · Shift 2

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/sFAyWjdXoR](https://www.prepwiser.in/questions/sFAyWjdXoR)

Q12 JEE Main 2025 · 3 Apr · Shift 1

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

(A) $-\frac{6\sqrt{2}}{5}$

(B) $-\frac{8\sqrt{2}}{5}$

(C) $-\frac{2\sqrt{2}}{5}$

(D) $-\frac{4\sqrt{2}}{5}$

[Step-by-step solution ► prepwiser.in/questions/_-r0stB2bo](https://www.prepwiser.in/questions/_-r0stB2bo)

Q13 JEE Main 2025 · 28 Jan · Shift 2

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

(A) $4(\log_e 2 - 2)$

(B) $\log_{e^2} 2 + 2$

(C) $2 - \log e^2$

(D) $4(\log_e 2 + 2)$

[Step-by-step solution ► prepwiser.in/questions/qen5x7fW3u](https://www.prepwiser.in/questions/qen5x7fW3u)

Q14 JEE Main 2025 · 24 Jan · Shift 2

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/2tIr7vgVHn](https://www.prepwiser.in/questions/2tIr7vgVHn)

Q15 JEE Main 2024 · 9 Apr · Shift 1

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

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

[Step-by-step solution ► prepwisar.in/questions/Nq6TXtXXAi](https://www.prepwisar.in/questions/Nq6TXtXXAi)

Q16 JEE Main 2024 · 8 Apr · Shift 1

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

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

[Step-by-step solution ► prepwisar.in/questions/q6PwZhfmG5](https://www.prepwisar.in/questions/q6PwZhfmG5)

Q17 JEE Main 2024 · 8 Apr · Shift 2

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwisar.in/questions/zgR1FEzUp3](https://www.prepwisar.in/questions/zgR1FEzUp3)

Q18 JEE Main 2024 · 29 Jan · Shift 2

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

- (A) $2 \sec \theta$ (B) $8 \operatorname{cosec}(2\theta)$
(C) $4 \operatorname{cosec}(2\theta)$ (D) $4 \sec \theta$

[Step-by-step solution ► prepwisar.in/questions/EjDDpeHrXv](https://www.prepwisar.in/questions/EjDDpeHrXv)

Q19 JEE Main 2024 · 29 Jan · Shift 1

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

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

[Step-by-step solution ► prepwisar.in/questions/w1HycquGN9](https://www.prepwisar.in/questions/w1HycquGN9)

Q20 JEE Main 2024 · 27 Jan · Shift 2

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

- (A) $\log_e \left(\left| \tan^{-1} \left(x^3 + \frac{1}{x^3} \right) \right| \right)^{1/3} + C$
(B) $\log_e \left(\left| \tan^{-1} \left(x^3 + \frac{1}{x^3} \right) \right| \right) + C$
(C) $\log_e \left(\left| \tan^{-1} \left(x^3 + \frac{1}{x^3} \right) \right| \right)^{1/2} + C$
(D) $\log_e \left(\left| \tan^{-1} \left(x^3 + \frac{1}{x^3} \right) \right| \right)^3 + C$

[Step-by-step solution ► prepwisar.in/questions/bxo1qK7eRk](https://www.prepwisar.in/questions/bxo1qK7eRk)

Q21 JEE Main 2023 · 15 Apr · Shift 1

Let $f(x) = \int \frac{dx}{(3+4x^2)\sqrt{4-3x^2}}$, $|x| < \frac{2}{\sqrt{3}}$. If $f(0) = 0$

and $f(1) = \frac{1}{\alpha\beta} \tan^{-1} \left(\frac{\alpha}{\beta} \right)$, $\alpha, \beta > 0$, then $\alpha^2 + \beta^2$ is equal to _____.

Numerical answer: enter the value.

[Step-by-step solution ► prepwisar.in/questions/FPyQeY7fPS](https://www.prepwisar.in/questions/FPyQeY7fPS)

Q22 JEE Main 2023 · 12 Apr · Shift 1

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwisar.in/questions/Q9wRDyPtFj](https://www.prepwisar.in/questions/Q9wRDyPtFj)

Q23 JEE Main 2023 · 8 Apr · Shift 1

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

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

[Step-by-step solution ► prepwisar.in/questions/Y-zUM2mW8n](https://www.prepwisar.in/questions/Y-zUM2mW8n)

Q24 JEE Main 2023 · 30 Jan · Shift 2

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

_____.

Numerical answer: enter the value.

[Step-by-step solution ► prepwisar.in/questions/4mPYeXt5rh](https://www.prepwisar.in/questions/4mPYeXt5rh)

Q25 JEE Main 2023 · 25 Jan · Shift 1

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

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

[Step-by-step solution ► prepwisar.in/questions/OMSjMn6W4O](https://www.prepwisar.in/questions/OMSjMn6W4O)

Q26 JEE Main 2022 · 25 Jul · Shift 1

The slope of the tangent to a curve $C : y = y(x)$ at any point (x, y) on it is $\frac{2e^{2x}-6e^{-x}+9}{2+9e^{-2x}}$. If C passes through the points $(0, \frac{1}{2} + \frac{\pi}{2\sqrt{2}})$ and $(\alpha, \frac{1}{2}e^{2\alpha})$, then e^α is equal to :

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

Step-by-step solution ► [prepwiser.in/questions/2w0sZjYypw](https://www.prepwiser.in/questions/2w0sZjYypw)

Q27 JEE Main 2022 · 30 Jun · Shift 1

Let

$$f(t) = \int_0^t e^{x^3} \left(\frac{x^8}{(x^6 + 2x^3 + 2)^2} \right) dx$$

. If $f(1) + f'(1) = \alpha e - \frac{1}{6}$, then the value of 150α is equal to _____.

Numerical answer: enter the value.

Step-by-step solution ► [prepwiser.in/questions/2NqEvUjKpH](https://www.prepwiser.in/questions/2NqEvUjKpH)

Q28 JEE Main 2022 · 26 Jun · Shift 2

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

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

Step-by-step solution ► [prepwiser.in/questions/gVLI5hCcRj](https://www.prepwiser.in/questions/gVLI5hCcRj)

Q29 JEE Main 2021 · 31 Aug · Shift 1

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

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

Step-by-step solution ► [prepwiser.in/questions/bTRRMzz06n](https://www.prepwiser.in/questions/bTRRMzz06n)

Q30 JEE Main 2021 · 27 Aug · Shift 1

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

Numerical answer: enter the value.

Step-by-step solution ► [prepwiser.in/questions/0j8eZiVkyA](https://www.prepwiser.in/questions/0j8eZiVkyA)

Q31 JEE Main 2021 · 18 Mar · Shift 1

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

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

[Step-by-step solution ► prepwiser.in/questions/U2b1vjGIYm](https://www.prepwiser.in/questions/U2b1vjGIYm)

Q32 JEE Main 2021 · 18 Mar · Shift 1

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/kXtdYpZF23](https://www.prepwiser.in/questions/kXtdYpZF23)

Q33 JEE Main 2021 · 16 Mar · Shift 2

For real numbers α, β, γ and δ , if

$$\int \frac{(x^2-1) + \tan^{-1}\left(\frac{x^2+1}{x}\right)}{(x^4+3x^2+1)\tan^{-1}\left(\frac{x^2+1}{x}\right)} dx$$

$$= \alpha \log_e \left(\tan^{-1} \left(\frac{x^2+1}{x} \right) \right) + \beta \tan^{-1} \left(\frac{\gamma(x^2+1)}{x} \right) + \delta \tan^{-1} \left(\frac{x^2+1}{x} \right) + C$$

where C is an arbitrary constant, then the value of $10(\alpha + \beta\gamma + \delta)$ is equal to _____.

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/eiOmwVVfMq](https://www.prepwiser.in/questions/eiOmwVVfMq)

Q34 JEE Main 2021 · 25 Feb · Shift 2

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

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

[Step-by-step solution ► prepwiser.in/questions/njIWg1snkb](https://www.prepwiser.in/questions/njIWg1snkb)

Q35 JEE Main 2021 · 25 Feb · Shift 1

The value of the integral

$$\int \frac{\sin \theta \cdot \sin 2\theta (\sin^6 \theta + \sin^4 \theta + \sin^2 \theta) \sqrt{2\sin^4 \theta + 3\sin^2 \theta + 6}}{1 - \cos 2\theta} d\theta \text{ is :}$$

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

[Step-by-step solution ► prepwiser.in/questions/iz0iBcoO5x](https://www.prepwiser.in/questions/iz0iBcoO5x)

Q36 JEE Main 2021 · 24 Feb · Shift 1

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

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

[Step-by-step solution ► prepwiser.in/questions/Dv7iQ-WwMh](https://www.prepwiser.in/questions/Dv7iQ-WwMh)

Q37 JEE Main 2020 · 5 Sep · Shift 1

If

$$\int (e^{2x} + 2e^x - e^{-x} - 1) e^{(e^x + e^{-x})} dx = g(x) e^{(e^x + e^{-x})} + c$$

where c is a constant of integration, then $g(0)$ is equal to :

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

[Step-by-step solution ► prepwiser.in/questions/rd2llk_r6b](https://www.prepwiser.in/questions/rd2llk_r6b)

Q38 JEE Main 2020 · 5 Sep · Shift 2

If

$$\int \frac{\cos \theta}{5 + 7 \sin \theta - 2 \cos^2 \theta} d\theta = A \log_e |B(\theta)| + C,$$

where C is a constant of integration, then $\frac{B(\theta)}{A}$ can be :

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

[Step-by-step solution ► prepwiser.in/questions/5pNAOWuun8](https://www.prepwiser.in/questions/5pNAOWuun8)

Q39 JEE Main 2020 · 4 Sep · Shift 1

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

[Step-by-step solution ► prepwiser.in/questions/cPpmtzSzPu](https://www.prepwiser.in/questions/cPpmtzSzPu)

Q40 JEE Main 2020 · 3 Sep · Shift 2

If $\int \sin^{-1} \left(\sqrt{\frac{x}{1+x}} \right) dx = A(x)\tan^{-1}(\sqrt{x}) + B(x) + C$,

where C is a constant of integration, then the ordered pair (A(x), B(x)) can be :

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

(B) $(x + 1, \sqrt{x})$

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

(D) $(x - 1, \sqrt{x})$

[Step-by-step solution ► prepwisser.in/questions/8YeyEuraj4](https://www.prepwisser.in/questions/8YeyEuraj4)

Q41 JEE Main 2020 · 9 Jan · Shift 2

If $\int \frac{d\theta}{\cos^2\theta(\tan 2\theta + \sec 2\theta)} = \lambda \tan \theta + 2\log_e |f(\theta)| + C$

where C is a constant of integration, then the ordered pair $(\lambda, f(\theta))$ is equal to :

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

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

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

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

[Step-by-step solution ► prepwisser.in/questions/d2LqX1yjmW](https://www.prepwisser.in/questions/d2LqX1yjmW)

Q42 JEE Main 2020 · 9 Jan · Shift 1

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

(where C is a constant of integration)

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

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

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

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

[Step-by-step solution ► prepwisser.in/questions/isKx4idu0n](https://www.prepwisser.in/questions/isKx4idu0n)

Q43 JEE Main 2020 · 8 Jan · Shift 1

If $\int \frac{\cos x dx}{\sin^3 x (1 + \sin^6 x)^{2/3}} = f(x)(1 + \sin^6 x)^{1/\lambda} + c$

where c is a constant of integration, then $\lambda f\left(\frac{\pi}{3}\right)$ is equal to

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

(B) 2

(C) -2

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

[Step-by-step solution ► prepwisser.in/questions/5G41et5IUg](https://www.prepwisser.in/questions/5G41et5IUg)

Integration by Parts · 8 PYQs

Q44 JEE Main 2025 · 23 Jan · Shift 2

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

(A) 47

(B) 55

(C) 62

(D) 48

[Step-by-step solution ► prepwisser.in/questions/teYfc9eOBz](https://www.prepwisser.in/questions/teYfc9eOBz)

Q45 JEE Main 2025 · 22 Jan · Shift 2

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

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

[Step-by-step solution ► prepwiser.in/questions/8J5vHJcoUs](https://www.prepwiser.in/questions/8J5vHJcoUs)

Q46 JEE Main 2024 · 4 Apr · Shift 2

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/xalWN_TQ6E](https://www.prepwiser.in/questions/xalWN_TQ6E)

Q47 JEE Main 2023 · 11 Apr · Shift 1

For $m, n > 0$, let $\alpha(m, n) = \int_0^2 t^m (1 + 3t)^n dt$. If $11\alpha(10, 6) + 18\alpha(11, 5) = p(14)^6$, then p is equal to _____.

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/W0rED0rFHM](https://www.prepwiser.in/questions/W0rED0rFHM)

Q48 JEE Main 2023 · 10 Apr · Shift 1

If $I(x) = \int e^{\sin^2 x} (\cos x \sin 2x - \sin x) dx$ and $I(0) = 1$, then $I\left(\frac{\pi}{3}\right)$ is equal to :

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

[Step-by-step solution ► prepwiser.in/questions/o53KyNe7Li](https://www.prepwiser.in/questions/o53KyNe7Li)

Q49 JEE Main 2023 · 6 Apr · Shift 1

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

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

[Step-by-step solution ► prepwiser.in/questions/ia1RtBmUt3](https://www.prepwiser.in/questions/ia1RtBmUt3)

Q50 JEE Main 2022 · 29 Jul · Shift 2

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

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

[Step-by-step solution ► prepwiser.in/questions/0v0IVjvPjz](https://www.prepwiser.in/questions/0v0IVjvPjz)

Q51 JEE Main 2021 · 17 Mar · Shift 2

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/cLbW7uMqG5](#)

Partial Fractions · 3 PYQs

Q52 JEE Main 2021 · 31 Aug · Shift 2

If $\int \frac{\sin x}{\sin^3 x + \cos^3 x} dx =$

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/CCS3Uf_kbW](#)

Q53 JEE Main 2021 · 27 Aug · Shift 2

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

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/y4klSBPoEn](#)

Q54 JEE Main 2021 · 20 Jul · Shift 2

For $k \in \mathbb{N}$, let

$$\frac{1}{\alpha(\alpha+1)(\alpha+2)\dots\dots\dots(\alpha+20)} = \sum_{K=0}^{20} \frac{A_k}{\alpha+k}$$

, where $\alpha > 0$. Then the value of $100 \left(\frac{A_{14} + A_{15}}{A_{13}} \right)^2$ is equal to _____.

Numerical answer: enter the value.

[Step-by-step solution ► prepwiser.in/questions/NwbsePbLET](#)

Answer key: Indefinite Integration

Answers follow NTA's final answer keys. Typing errors are possible, so check doubtful answers against the official key. Spotted a mistake? [prepwise.in/feedback](https://www.prepwise.in/feedback) · Terms: [prepwise.in/terms](https://www.prepwise.in/terms)

Numbers match the question numbers above. For full working, open the solution link under each question.

1	A	2	C	3	D	4	B	5	D	6	A	7	B	8	C
9	C	10	19	11	379	12	A	13	A	14	16	15	D	16	D
17	7	18	B	19	D	20	A	21	28	22	64	23	C	24	1
25	D	26	B	27	16	28	A	29	C	30	15	31	A	32	4
33	6	34	B	35	C	36	B	37	B	38	C	39	B	40	A
41	C	42	B	43	C	44	B	45	A	46	1	47	32	48	D
49	A	50	A	51	1	52	3	53	7	54	9				

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