

Integral Calculus - 2

Date Planned : __ / __ / __	Daily Tutorial Sheet - 1	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Main (Archive)	Exact Duration : _____

1. The integral $\int_2^4 \frac{\log x^2}{\log x^2 + \log(36 - 12x + x^2)} dx$ is equal to: (2015)
 (A) 2 (B) 4 (C) 1 (D) 6
2. The integral $\int_0^\pi \sqrt{1 + 4\sin^2 \frac{x}{2} - 4\sin \frac{x}{2}} dx$ is equal to: (2014)
 (A) $\pi - 4$ (B) $\frac{2\pi}{3} - 4 - 4\sqrt{3}$ (C) $4\sqrt{3} - 4$ (D) $4\sqrt{3} - 4 - \pi/3$
3. The value of the integral $\int_{-\pi/2}^{\pi/2} \left(x^2 + \log \frac{\pi - x}{\pi + x} \right) \cos x \, dx$ is: (2012)
 (A) 0 (B) $\frac{\pi^2}{2} - 4$ (C) $\frac{\pi^2}{2} + 4$ (D) $\frac{\pi^2}{2}$
4. The value of $\int_{\sqrt{\log 2}}^{\sqrt{\log 3}} \frac{x \sin x^2}{\sin x^2 + \sin(\log 6 - x^2)} dx$ is: (2011)
 (A) $\frac{1}{4} \log \frac{3}{2}$ (B) $\frac{1}{2} \log \frac{3}{2}$ (C) $\log \frac{3}{2}$ (D) $\frac{1}{6} \log \frac{3}{2}$
5. The value of $\int_{-2}^0 [x^3 + 3x^2 + 3x + 3 + (x+1)\cos(x+1)] dx$ is: (2005)
 (A) 0 (B) 3 (C) 4 (D) 1
6. The value of the integral $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$ is: (2004)
 (A) $\frac{\pi}{2} + 1$ (B) $\frac{\pi}{2} - 1$ (C) -1 (D) 1
7. The integral $\int_{-1/2}^{1/2} \left([x] + \log \left(\frac{1+x}{1-x} \right) \right) dx$ equals: (2002)
 (A) $-\frac{1}{2}$ (B) 0 (C) 1 (D) $\log \left(\frac{1}{2} \right)$
8. The value of $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1 + a^x} dx, a > 0$, is: (2001)
 (A) π (B) $a\pi$ (C) $\frac{\pi}{2}$ (D) 2π

9. If $f(x) = \begin{cases} e^{\cos x} \sin x, & \text{for } |x| \leq 2 \\ 2 & , \text{ otherwise} \end{cases}$ then $\int_{-2}^3 f(x) dx$ is equal to: (2000)
 (A) 0 (B) 1 (C) 2 (D) 3
10. The value of the integral $\int_{e^{-1}}^{e^2} \left| \frac{\log_e x}{x} \right| dx$ is: (2000)
 (A) $3/2$ (B) $5/2$ (C) 3 (D) 5
11. $\int_{\pi/4}^{3\pi/4} \frac{dx}{1 + \cos x}$ is equal to: (1999)
 (A) 2 (B) -2 (C) $\frac{1}{2}$ (D) $-\frac{1}{2}$
12. The value of $\int_0^{\pi/2} \frac{dx}{1 + \tan^3 x}$ is: (1993)
 (A) 0 (B) 1 (C) $\pi/2$ (D) $\pi/4$
13. The value of the integral $\int_0^{\pi/2} \frac{\sqrt{\cot x}}{\sqrt{\cot x} + \sqrt{\tan x}} dx$ is: (1983)
 (A) $\pi/4$ (B) $\pi/2$ (C) π (D) None of these
14. Let $T > 0$ be a fixed real number. Suppose, f is a continuous function such that for all $x \in \mathbb{R}$, $f(x+T) = f(x)$. If $I = \int_0^T f(x) dx$, then the value of $\int_3^{3+3T} f(2x) dx$ is: (2002)
 (A) $\frac{3}{2}I$ (B) I (C) $3I$ (D) $6I$
15. The intercepts on X-axis made by tangents to the curve $y = \int_0^x |t| dt$, $x \in \mathbb{R}$, which are parallel to the line $y = 2x$ are equal to: (2013)
 (A) ± 1 (B) ± 2 (C) ± 3 (D) ± 4
16. If $\int_{\sin x}^1 t^2 f(t) dt = 1 - \sin x, \forall x \in (0, \pi/2)$, then $f\left(\frac{1}{\sqrt{3}}\right)$ is: (2005)
 (A) 3 (B) $\sqrt{3}$ (C) $1/3$ (D) None of these