

Topic :-INTEGRALS

1. The value of the integral $\int_0^\pi \log(1 + \cos x) dx$ is
 a) $\frac{\pi}{2} \log 2$ b) $-\pi \log 2$ c) $\pi \log 2$ d) None of these

2. $\int e^{\tan^{-1} x} \left(\frac{1+x+x^2}{1+x^2} \right) dx$ is equal to
 a) $x e^{\tan^{-1} x} + C$ b) $x^2 e^{\tan^{-1} x} + C$ c) $\frac{1}{x} e^{\tan^{-1} x} + C$ d) None of these

3. Let $I_1 = \int_a^{\pi-a} x f(\sin x) dx$, $I_2 = \int_a^{\pi-a} f(\sin x) dx$, then I_2 is equal to
 a) $\frac{\pi}{2} I_1$ b) πI_1 c) $\frac{2}{\pi} I_1$ d) $2I_1$

4. $\int \cos^{-1} \left(\frac{1}{x} \right) dx$ equals
 a) $x \sec^{-1} x + \cosh^{-1} x + c$ b) $x \sec^{-1} x - \cosh^{-1} x + c$
 c) $x \sec^{-1} x - \sin^{-1} x + c$ d) None of these

5. The value of $\int_0^1 \frac{dx}{x + \sqrt{1-x^2}}$ is
 a) $\frac{\pi}{3}$ b) $\frac{\pi}{2}$ c) $\frac{1}{2}$ d) $\frac{\pi}{4}$

6. For any natural number n , the value of the integral $\int_0^{\sqrt{n}} [x^2] dx$, is
 a) $n\sqrt{n} + \sum_{r=1}^n \sqrt{r}$ b) $n\sqrt{n} - \sum_{r=1}^n \sqrt{r}$ c) $\sum_{r=1}^n \sqrt{r} - n\sqrt{n}$ d) None of these

7. $\int \frac{1}{x} (\log_e x) dx$ is equal to
 a) $\log_e(1 - \log_e x) + c$ b) $\log_e(\log_e x - 1) + c$
 c) $\log_e(\log_e x - 1) + c$ d) $\log_e(1 + \log_e x) + c$

8. Let f be integrable over $[0, a]$ for any real a . If we define

$$I_1 = \int_0^{\pi/2} \cos \theta f(\sin \theta + \cos^2 \theta) d\theta$$
 and $I_2 = \int_0^{\pi/2} \sin 2\theta f(\sin \theta + \cos^2 \theta) d\theta$, then
 a) $I_1 = I_2$ b) $I_1 = -I_2$ c) $I_1 = 2I_2$ d) $I_1 = -2I_2$

9. Consider the following statements:

1. $\int_{-\pi/2}^{\pi/2} \sqrt{\cos x - \cos^3 x} dx = \frac{3}{4}$

2. $\int_0^4 (|x - 1| + |x - 3|) dx = 10$

Which of these is/are correct?

- a) Only (1) b) Only (2) c) Both of these d) None of these

10. The value of the integral $\int_{-\pi/4}^{\pi/4} \sin^{-4} x dx$ is

- a) $-\frac{8}{3}$ b) $\frac{3}{2}$ c) $\frac{8}{3}$ d) None of these

11. The value of $\lim_{x \rightarrow \infty} \frac{(\int_0^x e^x dx)^2}{\int_0^x e^{2x^3} dx}$, is

- a) 1 b) 2 c) 3 d) 0

12. 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

- a) 3 b) $\sqrt{3}$ c) $\frac{1}{3}$ d) None of these

13. If a is fixed real number such that $f(a - x) + f(a + x) = 0$, then $\int_0^{2a} f(x) dx =$

- a) $\frac{a}{2}$ b) 0 c) $-\frac{a}{2}$ d) $2a$

14. $\int \frac{dx}{\sin(x - a) \sin(x - b)}$ is

- a) $\frac{1}{\sin(a - b)} \log \left| \frac{\sin(x - a)}{\sin(x - b)} \right| + c$
b) $\frac{-1}{\sin(a - b)} \log \left| \frac{\sin(x - a)}{\sin(x - b)} \right| + c$
c) $\log \sin(x - a) \sin(x - b) + c$
d) $\log \left| \frac{\sin(x - a)}{\sin(x - b)} \right| + c$

15. Let $\int \sqrt{\frac{5-x}{2+x}} dx$ equal

- a) $\sqrt{x + 2} \sqrt{5 - x} + 3 \sin^{-1} \sqrt{\frac{x + 2}{3}} + C$
b) $\sqrt{x + 2} \sqrt{5 - x} + 7 \sin^{-1} \sqrt{\frac{x + 2}{7}} + C$
c) $\sqrt{x + 2} \sqrt{5 - x} + 5 \sin^{-1} \sqrt{\frac{x + 2}{5}} + C$
d) None of these

16. $\int \frac{2x^2 + 3}{(x^2 - 1)(x^2 + 4)} dx = a \log \left(\frac{x + 1}{x - 1} \right) + b \tan^{-1} \frac{x}{2}$, then (a, b) is

- a) $(-1/2, 1/2)$ b) $(1/2, 1/2)$ c) $(-1, 1)$ d) $(1, -1)$

17. $\int e^{x\frac{(x-1)}{x^2}} dx$ is equal to

a) $\frac{e^x}{x^2} + c$

b) $\frac{-e^x}{x^2} + c$

c) $\frac{e^x}{x} + c$

d) $\frac{-e^x}{x} + c$

18. The value of the integral $\int_0^{3\alpha} \operatorname{cosec}(x - \alpha)\operatorname{cosec}(x - 2\alpha)dx$, is

a) $2\sec a \log\left(\frac{1}{2} \operatorname{cosec} \alpha\right)$ b) $2\sec a \log\left(\frac{1}{2} \sec \alpha\right)$ c) $2 \operatorname{cosec} a \log(\sec \alpha)$ d) $2 \operatorname{cosec} a \log\left(\frac{1}{2} \sec \alpha\right)$

19. $\int_0^3 \frac{3x+1}{x^2+9} dx$ is equal to

a) $\log(2\sqrt{2}) + \frac{\pi}{12}$

b) $\log(2\sqrt{2}) + \frac{\pi}{2}$

c) $\log(2\sqrt{2}) + \frac{\pi}{6}$

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

20. $\int \frac{dx}{\sqrt{(1-x)(x-2)}}$ is equal to

a) $\sin^{-1}(2x - 3) + c$

b) $\sin^{-1}(2x + 5) + c$

c) $\sin^{-1}(3 - 2x) + c$

d) $\sin^{-1}(5 - 2x) + c$

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