

Topic :-INTEGRALS

1. Let $f(x) = \int \frac{x^2 dx}{(1+x^2)(1+\sqrt{1+x^2})}$ and $f(0) = 0$. Then, $f(1)$ is
 a) $\log(1 + \sqrt{2})$ b) $\log(1 + \sqrt{2}) - \frac{\pi}{4}$ c) $\log(1 + \sqrt{2}) + \frac{\pi}{4}$ d) None of these

2. The value of the integral $\int_0^1 \frac{1}{(1+x^2)^{3/2}} dx$, is
 a) $1/2$ b) $1/\sqrt{2}$ c) 1 d) $\sqrt{2}$

3. If $I(m, n) = \int_0^1 t^m(1+t)^n dt$, then the expression for $I(m, n)$ in terms of $I(m+1, n-1)$ is
 a) $\frac{2^n}{m+1} - \frac{n}{m+1} I(m+1, n-1)$ b) $\frac{n}{m+1} I(m+1, n-1)$
 c) $\frac{2^n}{m+1} + \frac{n}{m+1} I(m+1, n-1)$ d) $\frac{m}{n+1} I(m+1, n-1)$

4. The value of $\int_0^1 \frac{\tan^{-1}x}{1+x^2} dx$ is
 a) $\frac{\pi}{4}$ b) $\frac{\pi^2}{32}$ c) 1 d) None of these

5. The value of $\int_3^5 \frac{x^2}{x^2-4} dx$ is
 a) $2 - \log_e \left(\frac{15}{7}\right)$ b) $2 + \log_e \left(\frac{15}{7}\right)$
 c) $2 + 4\log_e 3 - 4\log_e 7 + 4\log_e 5$ d) $2 - \tan^{-1} \left(\frac{15}{7}\right)$

6. $\int \sqrt{x^2 + a^2} dx$ equals
 a) $\frac{x}{2}\sqrt{x^2 + a^2} - \frac{a^2}{2}\log\{x + \sqrt{x^2 + a^2}\} + c$ b) $\frac{x}{2}\sqrt{x^2 + a^2} + \frac{a^2}{2}\log\{x + \sqrt{x^2 + a^2}\} + c$
 c) $\frac{x}{2}\sqrt{x^2 + a^2} - \frac{a^2}{2}\log\{x - \sqrt{x^2 + a^2}\} + c$ d) $\frac{x}{2}\sqrt{x^2 + a^2} + \frac{a^2}{2}\log\{x - \sqrt{x^2 + a^2}\} + c$

7. $I_n = \int_0^{\pi/4} \tan^n x dx$, then $\lim_{n \rightarrow \infty} n[I_n + I_{n+2}]$ is equal to
 a) $\frac{1}{2}$ b) 1 c) ∞ d) zero

8. $\int (x^2 + 1)\sqrt{x+1} dx$ is equal to
 a) $\frac{(x+1)^{7/2}}{7} - 2\frac{(x+1)^{5/2}}{5} + 2\frac{(x+1)^{3/2}}{3} + c$ b) $2\left[\frac{(x+1)^{7/2}}{7} - 2\frac{(x+1)^{5/2}}{5} + 2\frac{(x+1)^{3/2}}{3}\right] + c$
 c) $\frac{(x+1)^{7/2}}{7} - 2\frac{(x+1)^{5/2}}{5} + 5$ d) $\frac{(x+1)^{7/2}}{7} - 3\frac{(x+1)^{5/2}}{5} + 11(x+1)^{1/2} + c$

9. $\int \frac{f'(x)}{f(x) \log[f(x)]} dx$ is equal to
 a) $\frac{f(x)}{\log f(x)} + c$ b) $f(x) \log f(x) + c$ c) $\log[\log f(x)] + c$ d) $\frac{1}{\log[\log f(x)]} + c$
10. Consider the integrals
 $I_1 = \int_0^1 e^{-x} \cos^2 x \, dx$, $I_2 = \int_0^1 e^{-x^2} \cos^2 x \, dx$, $I_3 = \int_0^1 e^{-x^2} \, dx$ and $I_4 = \int_0^1 e^{-(1/2)x^2} \, dx$. The greatest of these integral is
 a) I_1 b) I_2 c) I_3 d) I_4
11. $\int \frac{1}{(1+x^2)\sqrt{1-x^2}} dx$ is equal to
 a) $\frac{1}{2} \tan^{-1} \left(\frac{\sqrt{2}x}{\sqrt{1-x^2}} \right)$ b) $\frac{1}{\sqrt{2}} \tan^{-1} \left(\frac{\sqrt{2}x}{\sqrt{1+x^2}} \right)$ c) $\frac{1}{\sqrt{2}} \tan^{-1} \left(\frac{\sqrt{2}x}{\sqrt{1-x^2}} \right)$ d) None of these
12. The value of the integral $\int_{1/n}^{(an-1)/n} \frac{\sqrt{x}}{\sqrt{a-x} + \sqrt{x}} dx$ is
 a) $\frac{a}{2}$ b) $\frac{na+2}{2n}$ c) $\frac{na-2}{2n}$ d) None of these
13. The value of $\int e^x(x^5 + 5x^4 + 1) dx$ is
 a) $e^x \cdot x^5 + c$ b) $e^x \cdot x^5 + e^x + c$ c) $e^{x+1} \cdot x^5 + c$ d) $5x^4 \cdot e^x + c$
14. If $\int_{-1/2}^{1/2} \cos x \log \left(\frac{1+x}{1-x} \right) dx = k \cdot \log 2$, then k equals
 a) 0 b) -1 c) -2 d) $\frac{1}{2}$
15. $\int \sin \sqrt{x} \, dx$ is equal to
 a) $\sin \sqrt{x} - \sqrt{x} \cos \sqrt{x}$ b) $2(\sin \sqrt{x} - \sqrt{x} \cos \sqrt{x}) + c$
 c) $\cos \sqrt{x} - \sqrt{x} \sin \sqrt{x} + c$ d) $2(\cos \sqrt{x} - \sqrt{x} \sin \sqrt{x}) + c$
16. If $f(x) = \int_x^{x^2} (t-1) dt$, $1 \leq x \leq 2$, then global maximum value of $f(x)$ is
 a) 1 b) 2 c) 3 d) 4
17. $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{r=1}^n \frac{r}{\sqrt{n^2+r^2}}$ is equal to
 a) $1 - \sqrt{2}$ b) $\sqrt{2} - 1$ c) $\sqrt{2}$ d) $-\sqrt{2}$
18. The value of $\int_0^{2\pi} \cos^{99} x \, dx$, is
 a) 1 b) -1 c) 99 d) 0
19. The value of $\int_{-2}^2 (ax^3 + bx + c) dx$ depends on the
 a) Value of b b) Value of c c) Value of a d) Values of a and b
20. The value of integral $\int_0^\pi x f(\sin x) \, dx$ is

a) 0

b) $\pi \int_0^{\pi/2} f(\sin x) dx$ c) $\frac{\pi}{4} \int_0^{\pi} f(\sin x) dx$ d) None of these

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