

Topic :-INTEGRALS

1. Let $f(x) = \int_0^x |x - 2| dx, x \geq 0$. Then, $f'(x)$ is
 - a) Continuous and non differentiable at $x = 2$
 - b) Discontinuous at $x = 4$
 - c) Neither continuous nor differentiable at $x = 2$
 - d) Non-differentiable at $x = 4$

2. If $f(t)$ is an odd function, then $\int_0^x f(t) dt$ is

a) An odd function	b) An even function
c) Neither even nor odd	d) 0

3. $\int \frac{\sec x \operatorname{cosec} x}{2 \cot x - \sec x \operatorname{cosec} x} dx$ is equal to

a) $\log \sec x + \tan x + c$	b) $\log \sec x + \operatorname{cosec} x + c$
c) $\frac{1}{2} \log \sec 2x + \tan 2x + c$	d) $\log \sec 2x + \operatorname{cosec} 2x + c$

4. $\int_0^\pi \frac{\theta \sin \theta}{1 + \cos^2 \theta} d\theta$ is equal to

a) $\frac{\pi^2}{2}$	b) $\frac{\pi^3}{3}$	c) π^2	d) $\frac{\pi^2}{4}$
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5. The value of $\left[\int_0^{\sin^2 \theta} \sin^{-1} \sqrt{\phi} d\phi + \int_0^{\cos^2 \theta} \cos^{-1} \sqrt{\phi} d\phi \right]$ is equal to

a) π	b) $\pi/2$	c) $\pi/3$	d) $\pi/4$
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6. $\int_0^{\pi/2} \frac{dx}{1 + \tan^3 x}$ is equal to

a) π	b) $\frac{\pi}{2}$	c) $\frac{\pi}{4}$	d) $\frac{3\pi}{2}$
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7. Let $I = \int_0^1 \frac{\sin x}{\sqrt{x}} dx$ and $J = \int_0^1 \frac{\cos x}{\sqrt{x}} dx$. Then, which one of the following is true?

a) $I > \frac{2}{3}$ and $J < 2$	b) $I > \frac{2}{3}$ and $J > 2$	c) $I < \frac{2}{3}$ and $J < 2$	d) $I < \frac{2}{3}$ and $J > 2$
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8. If $f(x) = \begin{cases} |x|, & -1 \leq x \leq 1 \\ |x-2|, & 1 < x \leq 3 \end{cases}$ then $\int_{-1}^3 f(x) dx$ is equal to

a) 0	b) 1	c) 2	d) 4
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9. $\int \frac{1}{x(x^n+1)} dx$ is equal to
 a) $\frac{1}{n} \log\left(\frac{x^n}{x^n+1}\right) + C$ b) $\frac{1}{n} \log\left(\frac{x^n+1}{x^n}\right)$ c) $\log\left(\frac{x^n}{x^n+1}\right) + C$ d) None of these
10. $\int_0^{1/2} |\sin \pi x| dx$ is equal to
 a) 0 b) π c) $-\pi$ d) $1/\pi$
11. The value of the integral $\int_0^\pi \frac{1}{a^2 - 2a \cos x + 1} dx$ ($a > 1$), is
 a) $\frac{\pi}{1-a^2}$ b) $\frac{\pi}{a^2-1}$ c) $\frac{2\pi}{a^2-1}$ d) $\frac{2\pi}{1-a^2}$
12. If $I = \int_0^1 \sqrt{1+x^3} dx$ then
 a) $I > 2$ b) $I \neq \frac{\sqrt{5}}{2}$ c) $I > \frac{\sqrt{7}}{2}$ d) None of these
13. Assuming that f is everywhere continuous, $\frac{1}{c} \int_{ac}^{bc} f\left(\frac{x}{c}\right) dx$ is equal to
 a) $\frac{1}{c} \int_a^b f(x) dx$ b) $\int_a^b f(x) dx$ c) $c \int_a^b f(x) dx$ d) $\int_{ac^2}^{bc^2} f(x) dx$
14. The value of the integral $\int e^{x\left(\frac{1-x}{1+x}\right)^2} dx$ is
 a) $e^{x\left(\frac{1-x}{1+x^2}\right)} + c$ b) $e^{x\left(\frac{1+x}{1+x^2}\right)} + c$ c) $\frac{e^x}{1+x^2} + c$ d) $e^x(1-x) + c$
15. Let $\frac{d}{dx}(F(x)) = \frac{e^{\sin x}}{x}$, $x > 0$. 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
16. The values of 'a' for which $\int_0^a (3x^2 + 4x - 5) dx < a^3 - 2$ are
 a) $\frac{1}{2} < a < 2$ b) $\frac{1}{2} \leq a \leq 2$ c) $a \leq \frac{1}{2}$ d) $a \geq 2$
17. The value of the integral $\int \frac{\log(x+1) - \log x}{x(x+1)} dx$ is
 a) $\frac{1}{2} [\log(x+1)]^2 + \frac{1}{2} (\log x)^2 + \log(x+1) \log x + C$
 b) $- \left[\{\log(x+1)\}^2 - (\log x)^2 \right] + \log(x+1) \cdot \log x + C$
 c) $\frac{1}{2} [\log(1+1/x)]^2 + C$
 d) None of these
18. The value of $\int_0^{2\pi} [2 \sin x] dx$, where $[\cdot]$ represents the greatest integral functions, is
 a) $-\frac{5\pi}{3}$ b) $-\pi$ c) $\frac{5\pi}{3}$ d) -2π
19. $\int_0^1 \frac{d}{dx} \left[\sin^{-1} \left(\frac{2x}{1+x^2} \right) \right] dx$ is equal to
 a) 0 b) π c) $\frac{\pi}{2}$ d) $\frac{\pi}{4}$

20. 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) $e - \frac{e^2}{2} - \frac{5}{2}$

b) $e + \frac{e^2}{2} - \frac{3}{2}$

c) $e - \frac{e^2}{2} - \frac{3}{2}$

d) $e + \frac{e^2}{2} + \frac{5}{2}$

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