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BHASKAR CLASSES PVT LTD

Integration and Differential Equation

1. Evaluate the following $\int \frac{(x^3+8)(x-1)}{x^2-2x+4}\,dx$.
2. Evaluate $\int sin2x\ sin3x\ dx$
3. Evaluate $\int \frac{8\,dx}{(x^3+3x^2+3x+1)\sqrt{x^2+2x-3}}$
4. Evaluate $\int \frac{1+x^2\log_e x}{x+x^2\log_e x}dx$
5. Evaluate $\int \frac{dx}{(x-p)\sqrt{(x-p)(x-q)}}$
6. Evaluate $\int \frac{1}{\sin x-\sin 2x}dx$
7. Evaluate $\int \frac{\log_{ex} e\ .\log_{e^2x} e\ .\log_{e^3x} e}{x}$ dx
8. Evaluate $\int (x-5)\sqrt{x^2+x}\ dx$
9. Evaluate $\int \frac{dx}{x^3\sqrt{x^2-1}}$
10. Evaluate $\int \sin(101x)\,.sin^{99}x\,dx$.
11. The integral $\int \left(1+x-\frac{1}{x}\right)e^{x+\frac{1}{x}}\,dx$ is equal to?
12. Find the value of $\int_0^4 [x]dx$, where [.] represents the greatest integer function.
13. If $f(x)=x+\sin x$, then find the value of $\int_\pi^{2\pi} f^{-1}(x)dx$.
14. Evaluate $\int_0^{\pi/2} \frac{sin^2x\,dx}{\sin x+\cos x}$.
15. If a continuous function f on [0, a] satisfies $f(x)f(a-x)=1, a>0$, then find the value of $\int_0^a \frac{dx}{1+f(x)}$.
16. Evaluate $\int_0^{\frac{\pi}{2}} x\cot x\,dx$
17. Evaluate $\int_{-\infty}^0 \frac{te^t}{\sqrt{1-e^{2t}}}\,dt$
18. Find the points of minima for $f(x)=\int_0^x t(t-1)(t-2)dt$
19. Determine a positive integer n such that $\int_0^{\pi/2} x^n \sin x dx = \frac{3}{4}(\pi^2-8)$
20. The value of the integral $\int_0^{1/2} \frac{1+\sqrt{3}}{((x+1)^2(1-x)^6)^{1/4}}\,dx$ is _____.

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21. The value of $\int_0^1 4x^3 \left\{\frac{d^2}{dx^2}(1-x^2)^5\right\} dx$ is _____.
22. Find the order and degree (if defined) of the following differential equation $\frac{d^4y}{dx^4} - sin\left(\frac{d^3y}{dx^3}\right) = 0$
23. Find the differential equation whose general solution is given $y = (c_1 + c_2)\cos(x + c_3) - c_4 e^{x+c_5}$ where $c_1, c_2, c_3, c_4, and\ c_5$ are arbitrary constants.
24. Show that the differential equation $(x^2 + xy)dy = (x^2 + y^2)dx$ is homogeneous and solve it.
25. Solve $\frac{dy}{dx} = \frac{2x-y+1}{x+2y-3}$
26. Solve $\left(\frac{dy}{dx}\right) + \left(\frac{y}{x}\right) = y^3$
27. If length of tangent at any point on the curve $y = f(x)$ intercepted between the point and the x-axis is of length 1. Find the equation of the curve.
28. Find the equation of family of curves which intersect the family of curves $xy = c$ at am angle $45°$.
29. Let $f: R \to R$ be a differentiable function with $f(0) = 0$. If $y = f(x)$ satisfies the differential equation, $\frac{dy}{dx} = (2 + 5y)(5y - 2)$, then the value of $\lim_{x\to-\infty} f(x)$ is ____.
30. If $x\frac{dy}{dx} = x^2 + y - 2, y(1) = 1$, then $y(2)$ equals _____.