For all questions, answer E "NOTA" means none of the above answers is correct.

1. Evaluate: $\int_9^{16} \frac{1}{\sqrt{x-4}} dx$

A. $4\sqrt{3} - 2\sqrt{5}$ B. $4\sqrt{5} - 2\sqrt{3}$ C. $2\sqrt{3} - 4\sqrt{5}$ D. $4\sqrt{3} - 5\sqrt{2}$ E. NOTA

2. Find the *average value* of $f(x) = 2 + x - x^{-2}$ over the interval $1 \le x \le 3$.

A. 11/3 B. 22/3 C. 11/6 D. 10/3 E. NOTA

3. Evaluate: $\int_0^5 |2 - x| dx$

A. -5/2 B. 5/2 C. 11/2 D. 13/2 E. NOTA

4. Use the Trapezoidal rule with n = 4 to approximate $\int_0^4 \sqrt{x^2 + 1} dx$.

A. $(1 + \sqrt{2} + \sqrt{5} + \sqrt{10} + \sqrt{17})/2$ B. $1 + \sqrt{2} + \sqrt{5} + \sqrt{10} + \sqrt{17}$

C. $(1 + 2\sqrt{2} + 2\sqrt{5} + 2\sqrt{10} + \sqrt{17})/2$ D. $1 + 2\sqrt{2} + 2\sqrt{5} + 2\sqrt{10} + \sqrt{17}$ E. NOTA

5. Evaluate: $\int_1^9 e^{\sqrt{x}} dx$

A. e^3 B. $2e^3$ C. $3e^3$ D. $4e^3$ E. NOTA

6. A region R is bounded by the graphs $y = e^x$, x = 0, x = e, and y = 0. Find the volume of the solid generated when R is revolved about the y-axis.

A. $2\pi[e^{e+1} + e^e + 1]$ B. $2\pi[e^{e+1} - e + 1]$ C. $2\pi[e^{e+1} - e^e - 1]$

D. $2\pi[e^{e+1} - e^e - 2]$ E. NOTA

7. Evaluate $\int (e^\pi / x - \ln x + e^{-\pi}) dx$ on the interval $(1, e^\pi)$.

A. $e^\pi - 1$ B. $2\sinh \pi$ C. $e^\pi + 1$ D. $2\cosh \pi$ E. NOTA

8. Given $y = \int_2^x \cos(\pi t^3) dt$, find the equation of the tangent line at x = 2.

A. x + y = 2 B. x + y = 3 C. x − y = 2 D. 2x − y = 3 E. NOTA

9. Evaluate: $\int_{\pi/2}^{3\pi/4} \sin^2(2t)\,dt$

A. π/2 B. π/4 C. π/6 D. π/8 E. NOTA

10. Evaluate: $\int \frac{\log_{10}(x^4 10^x)}{x} dx$

A. $\frac{(\ln x)^2}{2\ln 10} + x + C$ B. $\frac{2(\ln x)^2}{\ln 10} + x + C$ C. $\frac{4(\ln x)^2}{\ln 10} + x + C$

D. $\frac{(\ln x)^2}{4\ln 10} + x + C$ E. NOTA

11. Evaluate: $\int_0^2 \frac{1}{(2x-1)^{2/3}}\,dx$

A. $3\sqrt[3]{2}/2$ B. $3(1-\sqrt[3]{3})/2$ C. $2\sqrt[3]{2}/3$ D. $3(1+\sqrt[3]{3})/2$ E. NOTA

12. Find the particular solution of $\frac{du}{dt} = \frac{t+3t^2}{u^2}$, given u = 6 when t = 0. So u equals

A. $\sqrt[3]{t^2/2 + 3t^3 + 72}$ B. $\sqrt[3]{3t^2/2 + 3t^3 + 72}$ C. $\sqrt[3]{3t^2/2 + 3t^3 + 216}$

D. $\sqrt[3]{t^2/2 + 3t^3 + 216}$ E. NOTA

13. What is the coefficient of the x^{13} term of $\int \left[\frac{x^3}{2} - 2\right]^8 dx$?

A. 56/17 B. 60/13 C. 70/13 D. 80/17 E. NOTA

14. Which of the following is equal to $\int \cos x \csc x\,dx$?

A. ln|cos x| + C B. ln|sin x| + C C. -ln|cos x| + C D. -ln|sec x| + C E. NOTA

15. Find the area A of the region that lies within the limaçon r = 1 + 2cosθ and outside the circle r = 2.

A. $\frac{15\sqrt{3} - \pi}{6}$ B. $\frac{12\sqrt{3} - 2\pi}{6}$ C. $\frac{9\sqrt{3} - 2\pi}{6}$ D. $\frac{15\sqrt{3} - 2\pi}{6}$ E. NOTA

16. Evaluate: $\int_1^3 \frac{x+1}{x^2+2x+3}dx$

A. $2\ln\sqrt{3}$ B. $\ln\sqrt{3}$ C. $2\ln 3$ D. $\ln 3$ E. NOTA

17. A particle starts at rest and moves along the x-axis, its acceleration given by a(t) = t + cos(2t) for t ≥ 0. If the particle is located at x = 0 when t = 0, which x-value is the particle located when t = π?

A. $\pi^3 + ¼$ B. $\pi^3/6 + ½$ C. $\pi^3/6$ D. $\pi^3/2 + ¼$ E. NOTA

18. Evaluate: $\int_0^1 \int_0^{\pi/2} (e^y + \sin x)dxdy$

A. $\frac{\pi(e-1)}{2}+1$ B. $\pi(e+1)$ C. $\frac{\pi(e+1)}{2}$ D. $\frac{\pi(e-1)}{2}-1$ E. NOTA

19. What is the area of the region bounded between the graphs of y = x + 1 and y = 3 – x^2?

A. 5/3 B. 7/3 C. 9/2 D. 11/2 E. NOTA

20. If g(x) = $\int_1^{2x^2} (t-4)dt$, over what interval(s) is the graph of y = g(x) concave up?

A. $(-\infty,-\sqrt{2})\cup(\sqrt{2},\infty)$ B. $(-\infty,-\sqrt{2/3})\cup(\sqrt{2/3},\infty)$ C. $(-\sqrt{2/3},\sqrt{2/3})$
D. $(-\sqrt{2},\sqrt{2})$ E. NOTA

21. Evaluate the limit: $\lim_{x\to 1} \frac{\int_1^x 2(t\ln t - t + e^{t-1} + \pi t)dt}{x^2-1}$

A. π/2 B. π C. 3π/2 D. 2π E. NOTA

22. Find $\int \frac{x}{(2x+d)^2}dx$, where d ∈ Z^+ (d is a positive integer).

A. $\frac{1}{4}\ln|2x+d| + \frac{d}{4(2x+d)} + C$ B. $\frac{1}{4}\ln|2x+d| - \frac{d}{4(2x+d)} + C$ C. $\frac{1}{4}\ln|2x-d| + \frac{d}{4(2x-d)} + C$
D. $\frac{1}{2}\ln|2x+d| + \frac{d}{2(2x+d)} + C$ E. NOTA

23. A particle moves along the line with velocity v(t) = $4t^3$ (ft/sec). Find the *total distance* traveled (in feet) between time t = -2 and time t = 3.

A. 64 B. 65 C. 95 D. 97 E. NOTA

24. Suppose f(x) = ln(πx) and $f^{-1}(x)$ is its inverse. Then $\int f^{-1}(x)dx$ equals

A. $\frac{e^x}{\pi}+C$ B. $\frac{\pi}{e^x}+C$ C. $e^{\pi x}+C$ D. $e^x+\pi$ E. NOTA

25. The area bounded by the curve $y = x^2$ and the line y = 4 is divided into two equal portions by the line y = c. Find the value of *c*.

A. $2\sqrt{2}$ B. $\sqrt[3]{9}$ C. $\sqrt[3]{16}$ D. $\frac{3\sqrt{3}}{2}$ E. NOTA

26. The base of a solid is the region bounded by $y = 1 - x^2$ and $y = 1 - x^4$. Cross-sections of the solid that are perpendicular to the x-axis are squares. The expression to find the *volume* of the solid is

A. $\int_{-1}^{1}(x^4-x^2)^2\,dx$ B. $2\int_{0}^{1}(x^2-x^4)^2\,dx$ C. $2\int_{-1}^{1}(x^2-x^4)^2\,dx$

D. $2\int_{0}^{1}[(1-x^4)^2-(1-x^2)^2]dx$ E. NOTA

27. Evaluate: $\int \sin^3 x\cos^{-4} x\,dx$

A. $(\sec^3 x)/3 + \sec x + C$ B. $(\csc^3 x)/3 - \csc x + C$ C. $\sec x - (\sec^3 x)/3 + C$

D. $(\sec^3 x)/3 - \sec x + C$ E. NOTA

28. Find the area of the surface generated by revolving the curve with parametric equations x = t, $y = t^3$ on the interval $0 \le t \le 1$ about the x-axis .

A. $\pi(10\sqrt{10}-1)/9$ B. $\pi(10\sqrt{10}+1)/9$ C. $\pi(\sqrt{10}-1)/27$ D. $\pi(10\sqrt{10}+1)/27$ E. NOTA

29. Evaluate: $\int_{-100}^{100}(v+\sin v+v\cos v+\sin^3 v)^5\,dv$

A. 0 B. 50 C. 100 D. 200 E. NOTA

30. Determine the value of $\int_{0}^{1/2}\frac{1}{1-x^2}dx$.

A. ln 2 B. $\ln\sqrt{2}$ C. $\ln\sqrt{3}$ D. $\ln\sqrt{5}$ E. NOTA