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

1) Evaluate $\int_1^3 (2x^2 - x - 4)dx$.

A) 7/3 B) -8/3 C) 16/3 D) 20/3 E) NOTA

2) The given statement is contained in which of the following? If f is continuous on [a, b], then for every x in [a, b], $\frac{d}{dx}\int_a^x f(t)dt$ = f(x).

A) MVT for Integrals B) Long's Derivative Formula
C) Average Value of f D) Pappus's Theorem E) NOTA

3) Evaluate $\int_1^2 x6^{x^2-2}\,dx$.

A) 215/(12ln 6) B) 215/(2ln 6) C) 108/ln 6 D) 215/(12ln 3) E) NOTA

4) A particle moves on a coordinate line with an acceleration at time t of $e^{t/2}$ cm/sec^2. At t = 0, the particle is at the origin and its velocity is 6 cm/sec. How many centimeters does it travel during the time interval [0,4]?

A) $e^2 + 10$ B) $4e^2 + 8$ C) $4e^2 + 10$ D) $4e^2 + 12$ E) NOTA

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

A) $-\pi(e^{-2\pi} - 1)$ B) $-\pi(e^{-2\pi} - 1)/4$ C) $-\pi(e^{-2\pi} - 1)/2$ D) $-\pi(e^{-\pi} - 1)/2$ E) NOTA

6) Evaluate $\int_1^4 |2 - x|dx$.

A) 5/2 B) 7/2 C) 3/2 D) 2 E) NOTA

7) Find $\int \frac{x}{(x-b)^2}dx$, where $b \in Z^+$ (b is a positive integer).

A) $2\ln|x-b| - \frac{b}{x-b} + K$ B) $\ln|x-b| - \frac{b}{(x-b)^2} + K$

C) $\ln|x-b| + \frac{b}{x-b} + K$ D) $\ln|x-b| - \frac{b}{x-b} + K$ E) NOTA

8) What is the area of the region bounded between the graphs of x = y + 1 and $x = 3 - y^2$?

A) 9/2 B) 8/3 C) 15/4 D) 7/2 E) NOTA

9) The $\lim_{n\to\infty}\sum_{i=1}^{n} 3\left(-1-\frac{3i}{n}\right)^2\left(\frac{2}{n}\right)$ is correctly identified with the integral

A) $(3/2)\int_0^1 (1+x+9x^2)dx$ B) $6\int_0^1 (1+6x+9x^2)dx$ C) $45\int_3^{48} x^2 dx$ D) $3\int_0^1 (-1-3x)^2 dx$ E) NOTA

10) The reduction formula for $\int \sin^n x dx$, n∈ Z^+ is

A) $-\frac{1}{n}\cos x \sin^{n-1} x + \frac{n-1}{n}\int \sin^{n-2} x dx$ B) $\frac{1}{n}\cos x \sin^{n-1} x + \frac{n-1}{n}\int \sin^{n-2} x dx$

C) $-\frac{1}{n}\cos x \sin^{n-1} x + \frac{n-2}{n}\int \sin^{n-1} x dx$ D) $\frac{1}{n}\cos x \sin^{n-1} x + \frac{n-1}{n}\int \sin^{n+2} x dx$ E) NOTA

11) Find the *average value* of the function f(x) = 2 + |x| on [-2, 1].

A) 17/4 B) 7/6 C) 17/6 D) 19/6 E) NOTA

12) Evaluate $\int_0^1 \int_2^{\sqrt{y}} 2xy dx dy$.

A) 4/3 B) 3/5 C) -7/3 D) -5/3 E) NOTA

13) Evaluate $\int \frac{2-x}{x^2+16} dx$.

A) $\frac{1}{4}\left(\arctan(x/4) - \ln(x^2+16)\right) + C$ B) $\frac{1}{2}\left(\arctan(x/2) - \ln(x^2+16)\right) + C$

C) $\frac{1}{2}\left(\arctan(x/4) - \ln(x^2+16)\right) + C$ D) $\frac{1}{2}\arctan(x/4) - \ln(x^2+16) + C$ E) NOTA

14) Find the work done in pumping all the oil (density ρ = 50 lbs/ft^3) over the edge of a cylindrical tank that stands on one of its bases. Assume that the radius of the base is 4 feet, the height is 10 feet, and the tank is full of oil.

A) 40,000π ft-lbs B) 20,000π ft-lbs C) 30,000π ft-lbs D) 25,000π ft-lbs E) NOTA

15) When the graph of y = ln x^2 is revolved about the x-axis on [1, 2], the *surface area* may be calculated by

A) $2\pi\int_1^2 \ln x^2 \sqrt{1+(4/x^2)}dx$ B) $\pi\int_1^2 x^2\sqrt{1+(2/x)}dx$

C) $2\pi\int_1^2 \ln x^2 \sqrt{1+(4/x)}dx$ D) $2\pi\int_1^2 \ln x \sqrt{1+(4/x^2)}dx$ E) NOTA

16) Rewrite the double integral $\int_0^{\ln 10}\int_{e^x}^{10}\frac{1}{\ln y}dydx$ and switch the order of integration.

A) $\int_{e^x}^{10}\int_0^{\ln 10}\frac{1}{\ln y}dxdy$ B) $\int_1^{10}\int_0^{\ln y}\frac{1}{\ln y}dxdy$ C) $\int_2^{10}\int_1^{\ln y}\frac{1}{\ln x}dxdy$ D) $\int_1^{10}\int_1^{\ln y}\frac{1}{\ln y}dxdy$ E) NOTA

17) Evaluate $\int_0^1 \arctan x dx$.

A) $\frac{\pi}{2}-\ln\sqrt{2}$ B) $\frac{\pi}{4}-\ln 2$ C) $\frac{1}{2}(\pi-\ln\sqrt{2})$ D) $\frac{1}{2}(\frac{\pi}{2}-\ln 2)$ E) NOTA

18) What is the *moment* (M_x) about the x-axis of the region bounded by the graphs f(x) = $\sqrt{x}$ and g(x) = x^3 with uniform density ρ?

A) 3ρ/28 B) 5ρ/28 C) ρ/5 D) 4ρ/21 E) NOTA

19) Evaluate $\int \cos^2 t dt$.

A) $\frac{1}{2}\left(t-\frac{1}{2}\sin 2t\right)+C$ B) $\frac{1}{2}\left(t-\frac{1}{2}\cos 2t\right)+C$

C) $\frac{1}{2}\left(t+\frac{1}{2}\sin 2t\right)+C$ D) $\frac{1}{2}\left(t+\sin 2t\right)+C$ E) NOTA

20) Given $\int f(x)dx = \ln|\sec x(\sec x+\tan x)|+C$, find f(x).

A) $\frac{\cos x+1}{\sin x}$ B) $\frac{1-\sin x}{\cos x}$ C) $\frac{\sin x+1}{\cos x}$ D) $\frac{\sin x-1}{\cos x}$ E) NOTA

21) Evaluate $\int_{-2}^{4}(2\,[x] - 3|x|)dx$, where [x] denotes the greatest integer less than or equal to x.

A) -18 B) -24 C) -14 D) 16 E) NOTA

22) Given y = cosh x, find the arc length from (0, 1) to (1, cosh 1).

A) $\frac{e+e^{-1}}{2}$ B) $\frac{1}{2}e-e^{-1}$ C) $\frac{e-e^{-1}}{4}$ D) $\frac{e-e^{-1}}{2}$ E) NOTA

23) If F(x) = $x^2\int_{x^2}^{0}\cos^2 t dt$, find F'(x).

A) $-2x^3\cos^2x^2 - x^3 - \frac{x}{2}\sin 2x^2$ B) $-2x^3\cos^2x^2 - x^4 - \frac{x}{2}\sin 2x^2$

C) $-2x^3\sin^2x^2 - x^3 + \frac{x}{2}\cos 2x^2$ D) $-2x^2\cos^2x^2 - x^3 + \frac{x}{2}\cos 2x^2$ E) NOTA

24) Evaluate $\int_2^{\sqrt{8}} x^3\sqrt{x^2-4}dx$.

A) 255/14 B) 161/15 C) 256/15 D) 225/14 E) NOTA

25) Find the area of one leaf of the four-leaved rose r = 4sin 2θ.

A) π B) 3π/2 C) 2π D) 2π/3 E) NOTA

26) Evaluate $\int_3^4 \frac{\ln(x-1)}{(x-1)}dx$.

A) $\frac{1}{4}\left[(\ln 3)^3-(\ln 2)^2\right]$ B) $\frac{1}{2}\left[(\ln 3)^2-(\ln 2)^2\right]$

C) $\frac{1}{2}\left[(\ln 2)^3-(\ln 2)^2\right]$ D) $\frac{1}{4}\left[(\ln 3)^2-(\ln 2)^3\right]$ E) NOTA

27) Find the value of *c* such that the line x = c bisects the area bounded by y = $1/x^2$, y = 0, x = 1, and x = 6.

A) 19/7 B) 7/4 C) 5/3 D) 12/7 E) NOTA

28) $\int_0^4 \frac{1}{x-1}dx$ has a value of

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

29) The Gamma function, Γ(n) = (n - 1)! where n > 0, is also defined as

A) $\int_0^\infty x^{n-1}e^{-x}dx$ B) $\int_{-\infty}^\infty ne^{-x}dx$ C) $\int_0^\infty n^e x^{-n}dx$ D) $\int_{-\infty}^\infty x^{n-1}e^{x}dx$ E) NOTA

30) Evaluate $\int \frac{2x+1}{(x+5)^{100}}dx$.

A) $\frac{1}{49(x+5)^{98}}-\frac{1}{11(x+5)^{99}}+C$ B) $\frac{-1}{11(x+5)^{98}}+\frac{1}{49(x+5)^{99}}+C$ C) $\frac{-1}{49(x+5)^{98}}+\frac{1}{11(x+5)^{99}}+C$

D) $\frac{-1}{49(x+5)^{99}}+\frac{1}{11(x+5)^{98}}+C$ E) NOTA