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

1) Find f '(x) if f(x) = $\int_{x^4}^{2008} \frac{tdt}{\sqrt{t^3+2}}$.

A) $\frac{4x^7}{\sqrt{x^{12}+2}}$ B) $\frac{-4x^7}{\sqrt{x^{12}+2}}$ C) $\frac{-x^4}{\sqrt{x^{12}+2}}$ D) $\frac{x^4}{\sqrt{x^{12}+2}}$ E) NOTA

2) Evaluate $\int \frac{dx}{(x-2)(x+4)}$.

A) $\frac{1}{6}\ln\left|\frac{x-2}{x+4}\right|+C$ B) $\frac{1}{2}\ln\left|\frac{x+4}{x-2}\right|+C$ C) $\frac{1}{6}\ln\left|\frac{x-2}{x+4}\right|+C$ D) $\frac{1}{3}\ln\left|\frac{x+4}{x-2}\right|+C$ E) NOTA

3) Evaluate ln ($\lim_{x\to 0}(1+3ex)^{1/x}$) - ln ($\lim_{y\to\infty}(1+e/y)^{y}$).

A) e B) 2e C) 3e D) 4e E) NOTA

4) Use a Taylor polynomial with n = 3 to approximate $\int_{-1}^{1} \frac{\sin x dx}{x}$.

A) 1 - 1/12 + 1/360 B) 2 + 1/9 - 1/300 C) 2 - 1/12 + 1/300 D) 2 - 1/9 + 1/300 E) NOTA

5) Given $f(x) = x^2 - 1$, find a value "c " on the interval [1, 3] that satisfies the MVT for Integrals..

A) 2 B) $\sqrt{23/3}$ C) $\sqrt{11/3}$ D) $\sqrt{13/3}$ E) NOTA

6) Find the area bounded between the curves $f(x) = x^3 - 3x$ and $g(x) = 2x^2$ in the second quadrant.

A) 12/23 B) 7/12 C) 2/3 D) 3/5 E) NOTA

7) Given h = (b - a)/n, which of the following is Simpson's Rule for approximating $\int_a^b f(x)dx$, where $y_n = f(x_n)$?

A) $\frac{h}{4}(y_0 + 2y_1 + 4y_2 + 2y_3 + ...+ 4y_{n-2} + 2y_{n-1} + y_n)$, n is even

B) $\frac{h}{3}(y_0 + 4y_1 + 2y_2 + 4y_3 + ...+ 2y_{n-2} + 4y_{n-1} + y_n)$, n is even

C) $\frac{h}{2}(y_0 + 2y_1 + 2y_2 + ... + 2y_{n-2} + 2y_{n-1} + y_n)$

D) $\frac{h}{1}(y_0 + y_1 + y_2 + ... + y_{n-2} + y_{n-1} + y_n)$

8) Given y = 2sin(x) on [0, π] with centroid ($\pi/2$, $\bar{y}$), $\bar{y}$ is

A) $7\pi/20$ B) $\pi/5$ C) $\pi/4$ D) $3\pi/10$ E) NOTA

9) Given g(x) = 4sinh(.5x), find g ' (x).

A) 4cosh(.5x) B) -2cosh(.5x) C) 2cosh(.5x) D) 8cosh(.5x) E) NOTA

10) $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots + \frac{(-1)^n x^{2n+1}}{(2n+1)!} + \ldots$ is the Maclaurin series for which of the following?

A) y = cos x B) y = sinh(x) C) y = tan x D) $y = e^x$ E) NOTA

11) Evaluate $\int \cos^3(x)\sin^{-4}(x)dx$.

A) $\frac{-\csc^3 x}{3} + \csc x + C$ B) $-\csc^3 x + \csc x + C$ C) $\frac{\csc^3 x}{3} - \csc x + C$

D) $\frac{-\csc^5 x}{5} + \frac{\csc^3 x}{3} + C$ E) NOTA

12) Find the *particular solution* of $\frac{dz}{dt} = t^2 z^2$, given z = $\frac{1}{3}$ at t = 1.

A) z = $\frac{-3}{(20-t^3)}$ B) z = $\frac{3}{(10-t^3)}$ C) z = $\frac{-3}{(t^3+10)}$ D) z = $\frac{3}{(t^3-10)}$ E) NOTA

13) Evaluate $\int_4^\infty \frac{edx}{(\pi-x)^{2/3}}$.

A) ∞ B) $-\infty$ C) $-3e\sqrt[3]{\pi-4}$ D) $3e\sqrt[3]{\pi-4}$ E) NOTA

14) The values for A, B, and C respectively that make the statement $\lim_{x\to 1}\frac{Ax^4+Bx^3+1}{(x-1)\sin(\pi x)} = C$ true are

A) -4, 3, $6/\pi$ B) 3, -4, -6 C) 3, 4, $6/\pi$ D) 3, -4, $-6/\pi$ E) NOTA

15) Evaluate $\int_1^e \sqrt{x}\ln x\,dx$.

A) $\frac{2}{9}(e^{3/2}+2)$ B) $\frac{2}{9}(e^{3/2}-2)$ C) $-\frac{2}{9}(e^{3/2}+2)$ D) $\frac{2}{9}(e^{3/2}+1)$ E) NOTA

16) Snoopy, a 10-pound monkey, hangs at the end of a 20 foot chain that weighs ½ pound per foot. How much work does Snoopy do in climbing the chain to the top? Assume that the end of the chain is attached to the monkey.

A) 50 ft-lbs. B) 100 ft-lbs C) 250 ft-lbs D) 275 ft-lbs E) NOTA

17) Evaluate $\int_2^4 \frac{\sqrt{x^2-4}}{x}dx$.

A) $2\sqrt{3}-\frac{2\pi}{3}$ B) $\frac{2\pi}{3}+2\sqrt{3}$ C) $3\sqrt{2}-\frac{2\pi}{3}$ D) $4\sqrt{3}-\frac{2\pi}{3}$ E) NOTA

18) Use the Lagrange Remainder to determine the least degree of the Taylor polynomial about c = 1 to approximate ln1.1, so that the error is less than 10^{-10}. Hint: $\ln x = (x-1) - (x-1)^2/2 + (x-1)^3/3 - (x-1)^4/4 + \ldots$, $0 < x \le 2$

A) 6 B) 7 C) 8 D) 9 E) NOTA

19) Find $\frac{d^2y}{dx^2}$ for the curve given $x = 2t^2$ and $y = 4t - 3$.

A) $\frac{1}{-4t^2}$ B) $\frac{1}{2t^2}$ C) $\frac{1}{2t}$ D) $\frac{1}{-4t^3}$ E) NOTA

20) Arrange the following power series in order of radius of convergence, starting with the smallest radius.

I $\sum_{n=0}^{\infty}\frac{(x-1)^n}{(n+1)^2}$ II $\sum_{n=1}^{\infty}(-2x)^{n-1}$ III $\sum_{n=0}^{\infty}\frac{x^n}{(n+1)2^n}$

A) II, I, III B) III, II, I C) II, III, I D) I, II, III E) NOTA

21) The $\lim_{n\to\infty}\frac{e^{1/n}+e^{2/n}+e^{3/n}+\ldots+e^{n/n}}{2n}$ results in the following definite integral.

A) $2\int_0^1 e^x dx$ B) $\int_0^1 e^{2x}dx$ C) $2\int_0^1 e^{1/x}dx$ D) $\frac{1}{2}\int_0^1 e^x dx$ E) NOTA

22) The velocity of a particle moving in a plane is given by the vector-valued function

$\mathbf{r}'(t) = \frac{1}{1+t^2}\mathbf{i} + \frac{1}{t^2}\mathbf{j}$. Find $\mathbf{r}(t)$ given $\mathbf{r}(1) = 2\boldsymbol{i}$.

A) $(\tan^{-1}t + 2-\pi/4)\,\boldsymbol{i} + (-1/t + 1)\,\boldsymbol{j}$ B) $(\tan^{-1}t -2 + \pi/4)\,\boldsymbol{i} + (1/t + 1)\,\boldsymbol{j}$

C) $(\tan^{-1}t + 2 + \pi/4)\,\boldsymbol{i} + (-1/t + 1)\,\boldsymbol{j}$ D) $(\tan^{-1}t + 1 - \pi/4)\,\boldsymbol{i} - (1/t - 1)\,\boldsymbol{j}$ E) NOT

23) What is the volume of the three dimensional figure formed by taking equilateral triangle cross sections perpendicular to the x-axis along the graph $y = e^x - 1$ from $x = 0$ to $x = 3$?

A) $\frac{\sqrt{3}}{4}(e^6 - 4e^3 + 9)$ B) $\frac{\sqrt{3}}{8}(e^6 + 2e^3 + 9)$ C) $\frac{\sqrt{3}}{4}(e^6 - 2e^3 + 1)$ D) $\frac{\sqrt{3}}{8}(e^6 - 4e^3 + 9)$ E) NOTA

24) Given $\sum_{n=1}^{\infty}\frac{x^n}{n3^n}$, determine the radius of convergence.

A) (-3, 3) B) [-3, 3) C) (-3, 3] D) [-3, 3] E) NOTA

25) Find the volume of the torus obtained when the region inside the circle $x^2 + y^2 = a^2$ is revolved about the line $y = 3a$, $a > 0$.

A) $6\pi^2a^2$ B) $9\pi^2a^2$ C) $6\pi^2a^3$ D) $9\pi a^3$ E) NOTA

26) If f is a function such that $f'(x) = \cos(x^2)$, then the coefficient of x^9 in the Taylor series for $f(x)$ about $x = 0$ is

A) 1/216 B) -1/10 C) -1/216 D) 1/24 E) NOTA

27) Which of the following is equal to the area of the region inside the polar curve $r = 2\sin\theta$ and outside the polar curve $r = \sin\theta$?

A) $3\int_0^{\pi/2}\sin^2\theta d\theta$ B) $3\int_0^{\pi}\sin^2\theta d\theta$ C) $3\int_0^{\pi/2}\sin\ \theta d\theta$ D) $\frac{3}{2}\int_0^{\pi/2}\sin^2\theta d\theta$ E) NOTA

28) The region bounded by the graphs f(x) = e^{-x^2}, x = 0, y = 0, x = b, b > 0, is revolved around the y-axis. Find the volume of the resulting solid.

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

29) Use Euler's Method to obtain the approximate value of y(0.2) for the solution of $y' = (x + y - 1)^2$, given y(0) = 2 and a step size of 0.1.

A) 2.144 B) 2.244 C) 2.243 D) 2.143 E) NOTA

30) Find the arc length of the curve x = $\frac{y^4}{16}+\frac{1}{2y^2}$ from y = - 2 to y = - 1.

A) 25/16 B) 21/16 C) 5/2 D) 27/16 E) NOTA