If none of the answers given is correct choose NOTA.

1. $\int_0^1 \cos\left(\frac{\pi x}{2}\right) dx =$

a) 0 b) $\frac{2}{\pi}$ c) $\frac{\pi}{2}$ d) sin 1 e) NOTA

2. If $\int_1^8 f(x)dx = 5$ and $\int_8^5 f(x)dx = 7$, then $\int_1^5 f(x)dx =$

a) -2 b) 0 c) 2 d) 12 e) NOTA

3. $x + xy + 2y^2 = 6$. The slope of the line tangent to the curve in the first quadrant at $x = 2$ is

a) $\frac{-1}{3}$ b) $\frac{-1}{5}$ c) $\frac{1}{3}$ d) $\frac{2}{3}$ e) NOTA

4. How many critical points does the function f have if $f'(x) = (x + 1)^3 (x - 3)^2 (x^2 - 4)^4$?

a) 3 b) 4 c) 7 d) 9 e) NOTA

5. Find the average value of $f(x) = e^{4x} + 1$ on $[0, \frac{1}{4}]$.

a) $\frac{4e - 3}{8}$ b) $\frac{e + 1}{4}$ c) $\frac{e}{4}$ d) e e) NOTA

6. $\lim_{x \to 0} \frac{\sin(x)}{\tan(x)} =$

a) 0 b) 1 c) -1 d) 0.5 e) NOTA

7. Find an approximate value for $\int_0^6 2^{\cos(0.2x)} dx$ using right hand Riemann approximations with three equal subdivisions to the nearest thousandth.

a) 4.800 b) 9.600 c) 10.314 d) 10.314 e) NOTA

8. $g'(x) = h'(x)$ for all numbers x. $g(2) = 3$ and $h(2) = 5$. The graphs of g and h

a) have a common tangent at each point of tangency.
b) differ by a horizontal shift of 2.
c) do not intersect.
d) could intersect more than once.
e) NOTA

9. $f(x) = \sin(x) - \frac{\sin^3(x)}{3} + 5$. $f'(x) =$

a) $\cos^2(x) + \cos(x) - 1$ b) $\cos(x)(1 + \sin^2(x))$
c) $\cos^3(x)$ d) $\cos^2(x) - \cos(x) + 1$ e) NOTA

10. If [x] represents the greatest integer value of x find $\lim_{x \to \frac{-1}{2}} [x]$.

a) -1 b) -0.5 c) 0 d) 0.5 e) NOTA

11. A shopping club charges its members $200 per year. However, for each new member in excess of 60, the charge for every member is reduced by $2.00. What is the maximum revenue that can be generated by the club?

a) $4,000 b) $8,200 c) $12,800 d) $16,000 e) NOTA

12. $\int 5^{3x}\,dx =$

a) $\frac{5^{3x}}{3\ln 5} + C$ b) $\frac{5^{3x+1}}{3x+1} + C$ c) $\frac{(\ln 5)5^{3x}}{3} + C$ d) $\frac{\ln 5^{3x}}{3} + C$ e) NOTA

13. $\int \frac{1}{x\sqrt{1-(\ln x)^2}}\,dx$

a) $2\sqrt{1-(\ln x)^2} + C$ b) $\sin^{-1}(\ln x) + C$ c) $\sec^{-1}(\ln x) + C$ d) $\frac{(1-(\ln x)^2)^{\frac{-3}{2}}}{2} + C$ e) NOTA

14. The region bounded by $y = x$, $y = x^2$, $x = 1$, and $x = 2$ is rotated about the line $x = 1$. Find the volume of the resultant solid.

a) $\frac{2\pi}{3}$ b) $\frac{7\pi}{8}$ c) $\frac{19\pi}{18}$ d) $\frac{7\pi}{6}$ e) NOTA

15. The base of a pyramid - shaped tank is a square with sides of length 10 ft and the vertex of the pyramid is 12 ft above the base. Water is flowing into the tank at the constant rate of $2\ ft^3/min$. Find the rate of change in the depth of the water in the tank in ft/min when there is a depth of 6 ft.

a) $\frac{6}{75}$ b) $\frac{9}{25}$ c) $\frac{16}{55}$ d) $\frac{13}{150}$ e) NOTA

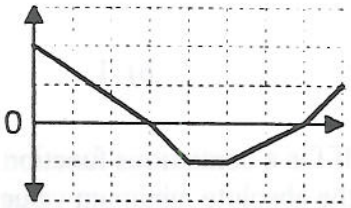
16. $\frac{dy}{dx} = \frac{\cos(x)}{3y^2}$, $y(\pi) = 4$, $y =$

a) $\sqrt[3]{\sin(x)} + 4$ b) $\frac{4}{-12\sin(x) + 1}$ c) $\frac{-\csc(x)}{3} + 4$ d) $\sqrt[3]{\sin(x) + 64}$ e) NOTA

17. At a certain chemical factory the production rate in gallons per hour after the factory opens in the morning is given by the function $f(x) = 16x^3 + 27x^2 + \sqrt{x}$. How much chemical in gallons is produced during the first 4 hours after opening?

a) 1576.5 b) 1600.25 c) $1605.\overline{3}$ d) 1764 'e) NOTA

18. The graph of the velocity of a particle moving on the x-axis is given. Each tick mark represents a unit of one. The particle starts at x = 2 when t = 0. Find the particle's position at the end of the trip (t = 8).



a) 1 b) 1.5 c) 3 d) 8 e) NOTA

19. $f(x) = x^3 + ax^2$, where a is a positive rational number. Where does f increase?

a) $(-\infty, 0) \cup (\frac{2a}{3}, \infty)$ b) $(\frac{-2a}{3}, 0)$ c) $(0, \frac{2a}{3})$ d) $(-\infty, \frac{-2a}{3}) \cup (0, \infty)$ e) NOTA

20. $\int_0^{\frac{\pi}{6}} \frac{\sin(x) + 1}{\cos(x)} dx =$

a) 0.5 b) $\sqrt{2} - 1$ c) 1 d) ln2 e) NOTA

21. f and g are functions such that f(2) = -1, f '(2) = 4, f "(2) = -2, g(2) = -3, g'(2) = 2, and g"(2) = 1. $\left(\frac{f}{g}\right)''(2) =$

a) $\frac{-19}{27}$ b) $\frac{1}{27}$ c) $\frac{4}{81}$ d) $\frac{10}{27}$ e) NOTA

22. Which of the following is an equation of the tangent line to the graph of the equation $y = xe^{\frac{1}{x^2}} + \ln|2 - x^2|$ at x = 1?

a) 2ex - y = e b) (2e+2)x - y = e+2 c) (e+2)x + y = 2e+2 d) (e-2)x - y = -2 e) NOTA

23. The position of a point moving rectilinearly on a coordinate line is given by $s(t) = t^3 - 12t^2 + 36t - 20$. Through how many units does the particle travel on [0, 9]?

a) 49 b) 81 c) 122 d) 145 e) NOTA

24. If $\lim_{x\to 2} f(x) = 8$, which of the following must be true?

i) f is continuous at x = 2. ii) f is differentiable at x =2. iii) f(2) = 8

a) i b) i, ii c) iii d) i, ii, iii e) NOTA

25. The area of the region enclosed by the graphs of $y = x$ and $y = x^2 - 3x + 3$ is

a) $\frac{2}{3}$ b) 1 c) $\frac{4}{3}$ d) 2 e) NOTA

26. If f is a continuous function defined for all real x and if the absolute maximum value of f is 9 and the absolute minimum value of f is -11, which of the following must be true?

i) f(x) = 0 for some x. ii) The absolute minimum value of f|x| is 0.

iii) The absolute maximum value of $|f(x)|$ is 9. iv) The absolute minimum value of $|f(x)|$ is 0.

a) i, ii, iii b) i, iv c) i, iii, iv d) i, ii, iii, iv e) NOTA

27. $\int_{-3}^{3} x^2 e^{\cos(x)} dx = \frac{r}{2}$, then $\int_{0}^{3} x^2 e^{\cos(x)} dx =$

a) $\frac{r}{4}$ b) $\frac{r}{2}$ c) r d) 2r e) NOTA

28. Given $f(x) = \frac{1}{4 - x^2}$, which of the following statements is false?

a) $\lim_{x\to\infty} f(x) = 0$ b) f is concave up over (-2,2).

c) $\lim_{x\to 2^-} f(x) = \infty$ d) The range of f is all reals. e) NOTA

29. Find $\frac{dy}{dx}$ if $y = \tan^{-1}(e^{3x})$.

a) $\frac{3e^{3x}}{\sqrt{1+e^{6x}}}$ b) $3e^{3x}\sec^{-2}(e^{3x})$ c) $\frac{3e^{3x}}{\sqrt{1+e^{3x^2}}}$ d) $\frac{3}{\sqrt{1+e^{(3x)^2}}}$ e) NOTA

30. A solid has is its base the region in the xy plane bounded by the graphs of $y^2 = 4x$ and x = 4. If every cross section by a plane perpendicular to the x-axis is a rectangle whose height is twice that of the side in the xy-plane. find the volume of the solid.

a) 108 b) 128 c) 256 d) 320 e) NOTA