MATHS

BOOKS - CENGAGE PUBLICATION

APPLICATION OF INTEGRALS

Others

1. Find the area of the figure enclosed by the curve $5x^2 + 6xy + 2y^2 + 7x + 6y + 6 = 0.$

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2. If the area by $y = x^2 + 2x - 3$ and the line $y = kx + 1$ is the least, find k and also the least area.

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3. Area enclosed by the curve $y = f(x)$ defined parametrically as $x = \frac{1-t^2}{1+t^2}, y = \frac{2t}{1+t^2}$ is equal

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4. Sketch and find the area bounded by the curve $\sqrt{|x|} + \sqrt{|y|} = \sqrt{a}$ and $x^2 + y^2 = a^2$ (where $a > 0$). $Ifcurve$|x|+|y|=a` divides the area in two parts, then find their ratio in the first quadrant only.

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5. Let $f(x) = \min\left(x+1, \sqrt{1-x}\right)$ for all $x \leq 1$. Then the area bounded by $y = f(x)$ and the x-axis is (a) $\frac{7}{3}$ sq units (b) $\frac{1}{6}$ sq units (c) $\frac{11}{6}$ sq units (d) $\frac{7}{6}$ sq units

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6. The area enclosed by $2|x| + 3|y| \leq 6$ is (a) 3 sq. units (b) 4 sq. units 12 sq. units (d) 24 sq. units

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7. If A_n is the area bounded by $y = x$ and $y = x^n, n \in \mathbb{N}$,then $A_2 A_3 \ldots A_n =$ (a) $\frac{1}{n(n+1)}$ (b) $\frac{1}{2^n n(n+1)}$ (c) $\frac{1}{2^{n-1} n(n+1)}$ (d) $\frac{1}{2^{n-2} n(n+1)}$

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8. Area enclosed between the curves $|y| = 1 - x^2$ and $x^2 + y^2 = 1$ is (a) $\frac{3\pi - 8}{3}$ (b) $\frac{\pi - 8}{3}$ (c) $\frac{2\pi - 8}{3}$ (d) None of these

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9. If the area of bounded between the x-axis and the graph of $y = 6x - 3x^2$ between the ordinates $x = 1$ and $x = a$ is 19 units, then a

can take the value: (A) 4 or -2 (B) one value is in (2, 3) and one in (-1, 0) (C) one value is in (3, 4) and one in (-2,-1) (D) none of these

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10. The area enclosed between the curves $y=(\log)_e(x+e), x=(\log)_e\left(\frac{1}{y}\right)$, and the x-axis is (a) $2squnits$ (b) $1squnits$ (c) $4squnits$ (d) none of these

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11. If A_n be the area bounded by the curve $y=(\tan x)^n$ and the lines $x=0,\ y=0,\ x=\pi/4$, then for $n>2$.

A. a. $A_n+A_{n-1}=\frac{1}{n-1}$

B. b. $A_n+A_{n-2}<\frac{1}{n-1}$

C. c. $A_n+A_{n+2}=\frac{1}{n+1}$

D. d. none of these

Answer: null

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12. Find all the possible values of $b > 0,$ so that the area of the bounded region enclosed between the parabolas $y = x - bx^2 andy = \frac{x^2}{b}$ is maximum.

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13. Let $f(x)$=M a xi mu m$\left\{x^2, (1-x)^2, 2x(1-x)\right\},$ where $0 \leq x \leq 1.$ Determine the area of the region bounded by the curves $y = f(x)$,x-axis ,x=0, and x=1.`

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14. Let $O(0, 0), A(2, 0), and B\left(1, \frac{1}{\sqrt{3}}\right)$ be the vertices of a triangle. Let R be the region consisting of all those points P inside OAB which satisfy $d(P, OA) \leq \min[d(P, OB), d(P, AB)]$, where d denotes the distance from the point to the corresponding line. Sketch the region R and find its area.

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15. The area bounded by the curve $f(x) = x + \sin x$ and its inverse function between the ordinates $x = 0 and x = 2\pi$ is $4\pi squnits$ (b) $8\pi squnits$ $4 squnits$ (d) $8 squnits$

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16. The area bounded by the x-axis, the curve $y = f(x),$ and the lines $x = 1, x = b$ is equal to $\sqrt{b^2 + 1} - \sqrt{2}$ for all $b > 1,$ then $f(x)$ is

A. (a) $\sqrt{x - 1}$

B. (b) $\sqrt{x+1}$

C. (c) $\sqrt{x^2+1}$

D. (d) $\frac{x}{\sqrt{1+x^2}}$

Answer: null

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17. Let $f(x)$ be a non-negative continuous function such that the area bounded by the curve $y=f(x)$, the x-axis, and the ordinates $x=\frac{\pi}{4} and x=\beta>\frac{\pi}{4} is \beta\sin\beta+\frac{\pi}{4}\cos\beta+\sqrt{2}\beta.$ Then $f\left(\frac{\pi}{2}\right)$ is $\left(\frac{\pi}{2}-\sqrt{2}-1\right)$ (b) $\left(\frac{\pi}{4}+\sqrt{2}-1\right)-\frac{\pi}{2}$ (c) $\left(1-\frac{\pi}{4}+\sqrt{2}\right)$

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18. The area bounded by the curves $y=\sin^{-1}|\sin x| and y=\sin^{-1}|\sin x|^2, where 0\leq x\leq 2\pi,$ is $\frac{1}{3}+\frac{\pi^2}{4}$ $sq units$ (b) $\frac{1}{6}+\frac{\pi^3}{8} sq units$ (c)$2 sq units$ (d) none of these

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19. The area bounded by the two branches of curve $(y-x)^2 = x^3$ and the straight line $x = 1$ is (a) $\frac{1}{5} squnits$ (b) $\frac{3}{5} squnits$ (c)$\frac{4}{5} squnits$ (d) $\frac{8}{4} squnits$

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20. The area bounded by the curves $y = \log_e x$ and $y = (\log_e x)^2$ is (A) $e-2$ sq. units (B) $3-e$ sq. units (C) e sq. units (D) $e-1$ sq. units

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21. The area of the region containing the points (x, y) satisfying $4 \leq x^2 + y^2 \leq 2(|x| + |y|)$ is

(a)$8 squnits$ (b) $2 squnits$ (c)$4\pi squnits$ (d) $2\pi squnits$

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22. Let $f(x) = x^3 + 3x + 2$ and $g(x)$ be the inverse of it. Then the area bounded by $g(x)$, the x-axis, and the ordinate at $x = -2andx = 6$ is

(a) $\frac{9}{2}sq.units$ (b) $\frac{4}{3}sq.units$ (c) $\frac{5}{4}sq.units$ (d) $\frac{7}{3}sq.units$

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23. Consider two curves $C_1 : y^2 = 4\left[\sqrt{y}\right]xandC_2 : x^2 = 4\left[\sqrt{x}\right]y,$ where [.] denotes the greatest integer function. Then the area of region enclosed by these two curves within the square formed by the lines $x = 1, y = 1, x = 4, y = 4$ is (a) $\frac{8}{3}sq.units$ (b) $\frac{10}{3}sq.units$ (c) $\frac{11}{3}sq.units$ (d) $\frac{11}{4}sq.units$

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24. The area of the region of the plane bounded by $\max(|x|, |y|) \leq 1$ and $xy \leq \frac{1}{2}$ is

(a) $\frac{1}{2} + \ln 2\ sq.\ units$

(b) $3 + \ln 2$ $sq.\ units$

(c) $\frac{31}{4}$ $sq.\ units$

(d) $1 + 2\ln 2$ $sq.\ units$

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25. The area of the figure bounded by the parabola $(y-2)^2 = x - 1$, the tangent to it at the point with the ordinate y=3, and the x-axis is

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26. The area of the loop of the curve $ay^2 = x^2(a-x)$ is

A. (a) $4a^2 sq\ units$

B. (b) $\frac{8a^2}{15} sq\ units$

C. (c) $\frac{16a^2}{9} sq\ units$

D. (d) None of these

Answer: null

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27. The area of the region bounded by $x=0, y=0, x=2, y=2, y \leq e^x$ and $y \geq 1nx$ is $(a)6-41n2squnits$ $(b)41n2-2squnits$ $(c)21n2-4squnits$ $(d)6-21n2squnits$

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28. If $f(x)=\sin x, \forall x \in \left[0, \frac{\pi}{2}\right], f(x)+f(\pi-x)=2, \forall x \in \left(\frac{\pi}{2}, \pi\right] andf(x)$ then the area enclosed by $y=f(x)$ and the x-axis is

(a)π sq $\cdot$ units

(b) 2π sq $\cdot$ units

(c) 2 sq $\cdot$ units

(d) 4sq $\cdot$ units

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29. The area enclosed by the curve $y = \sqrt{4 - x^2}, y \geq \sqrt{2}\sin\left(\frac{x\pi}{2\sqrt{2}}\right)$, and the x-axis is divided by the y-axis in the ratio.

(a) $\frac{\pi^2 - 8}{\pi^2 + 8}$

(b) $\frac{\pi^2 - 4}{\pi^2 + 4}$

(c) $\frac{\pi - 4}{\pi - 4}$

(d) $\frac{2\pi^2}{2\pi + \pi^2 - 8}$

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30. The area bounded by the curves $y = xe^x, y = xe^{-x}$ and the lines $x = 1$ is

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31. The area enclosed by the curves $xy^2 = a^2(a - x)$ and $(a - x)y^2 = a^2x$ is

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32. The area bounded by the loop of the curve $4y^2 = x^2(4 - x^2)$ is $(a) \frac{7}{3} sq.\ units\ (b) \frac{8}{3} squnites\ (c) \frac{11}{3} squnits\ (d) \frac{16}{3} squnits$

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33. The area bounded by the curve $f(x) = x + \sin x$ and its inverse function between the ordinates $x = 0 and x = 2\pi$ is $4\pi squnits$ (b) $8\pi squnits$ $4 squnits$ (d) $8 squnits$

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34. The area enclosed by the curve $y = \sin x + \cos x and y = |\cos x - \sin x|$ over the interval $\left[0, \frac{\pi}{2}\right]$ is $(a) 4(\sqrt{2} - 2)$ (b) $2\sqrt{2}$ ($\sqrt{2}$ -1) $(c) 2($$\sqrt{2}$ +1) (d) $2\sqrt{2}(\sqrt{2} + 1)$

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35. For which of the following values of m is the area of the regions bounded by the curve $y = x - x^2$ and the line $y = mx$ equal $\frac{9}{2}$? (a) -4 (b) -2 (c) 2 (d) 4

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36. The area of the region bounded by the curve $y = e^x$ and lines x=0 and y=e is

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37. Find the area bounded by the curves $x^2 + y^2 = 4$, $x^2 = -\sqrt{2}y$ and $x = y$

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38. For a point P in the plane, let $d_1(P) and d_2(P)$ be the distances of the point P from the lines $x - y = 0 and x + y = 0$ respectively. The area of the region R consisting of all points P lying in the first quadrant of the plane and satisfying $2 \leq d_1(P) + d_2(P) \leq 4,$ is

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39. If $a(a > 0)$ is the value of parameter for each of which the area of the figure bounded by the straight line $y = \frac{a^2 - ax}{1 + a^4}$ and the parabola $y = \frac{x^2 + 2ax + 3a^2}{1 + a^4}$ is the greatest, then the value of a^4 is___

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40. Consider two curves $C_1 : y = \frac{1}{x} and C_2 : y = \log x$ on the xy plane. Let D_1 denotes the region surrounded by $C_1, C_2,$ and the line $x = 1 and D_2$ denotes the region surrounded by C_1, C_2 and the line $x = a$. If $D_1 = D_2,$ then the sum of logarithm of possible value of a is

____

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41. Find the area bounded by $y^2 \leq 4x, x^2 + y^2 \geq 2x, and x \leq y + 2$ in the first quadrant.

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42. Find the area of the region R which is enclosed by the curve $y \geq \sqrt{1 - x^2}$ and max $\{|x|, |y|\} \leq 4$.

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43. Find the area of the region enclosed by the curves $y = x \log x$ and $y = 2x - 2x^2$.

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44. Find the area of the region $\{(x, y) : y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\}$

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45. Find the area of the figure bounded by the parabolas $x = -2y^2, x = 1 - 3y^2$.

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46. Find the area bounded by $y = \frac{1}{x^2 - 2x + 2}$ and x-axis.

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47. Find the area bounded by $x = 2y - y^2$ and the $y - axis$.

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48. Find the area bounded by $y = \sin^{-1} x, y = \cos^{-1} x$,and the X-axis.

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49. Draw a rough sketch of the curve y=$(x-1)^2(x-2)(x-3)^3$

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50. Find the area bounded by (a) $y = (\log)_e |x| and y = 0$ (b) $y = |(\log)_e |x| \mid | and y = 0$

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51. Sketch the curves and identity the region bounded by $x = \frac{1}{2}, x = 2, y = \ln x, and y = 2^x$. Find the area of this region.

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52. Sketch the region bounded by the curves $y = x^2$ and $y = \frac{2}{1+x^2}$. Find the area.

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53. Find the area of the region bounded by the curve C : y=tan x ,tangent drawn to C at x=pi/4, and the x-axis.

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54. Compute the area of the region bounded by the curves $y = ex(\log)_e x and y = \frac{\log x}{ex}$

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55. AOB is the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ which has $OA = a, OB = b$. Then find the area between the arc AB and the chord

AB of the ellipse.

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56. Find the area bounded by the curves y=sin x and y=cos x between two consecutive points of the intersection.

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57. In what ratio does the x-axis divide the area of the region bounded by the parabolas $y = 4x - x^2 and y = x^2 - x$?

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58. Consider a square with vertices at $(1, 1)(-1, 1)(-1, -1)$ and $(1, -1)$. Let S be the region consisting of all points inside the square which are nearer to the origin than to any edge. Sketch the region S and find its area.

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59. Find the area bounded by $y = x^3 - x$ and y=$x^2 + x$.

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60. Find the area lying above x-axis and included between the circle $x^2 + y^2 = 8x$ and inside in the parabola $y^2 = 4x$.

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61. Consider the region formed by the lines $x = 0, y = 0, x = 2, y = 2$. If the area enclosed by the curves $y = e^x andy = 1nx$, within this region, is being removed, then find the area of the remaining region.

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62. Find the area bounded by the curve $y = (x - 1)(x - 2)(x - 3)$ lying between the ordinates $x = 0 and x = 3$.

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63. Find the area bounded by the parabola $y = x^2 + 1$ and the straight line $x + y = 3$.

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64. Find the area of the closed figure bounded by the curves $y = \sqrt{x}, y = \sqrt{4 - 3x} \text{ and } y = 0$

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65. Find the area of the smaller part of the circle $x^2 + y^2 = a^2$ cut off by the line $x = \frac{a}{\sqrt{2}}$.

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66. Column I, Column II Area enclosed by $y = [x] and y = \{x\}$, where [.] and {.} represent greatest integer and fractional part functions, respectively., p. 32/5 sq. units The area bounded by the curves $y^2 = x^3 and |y| = 2x$, q. 1. sq. units The smaller area included between the curves $\sqrt{x} + \sqrt{|y|} = 1$ and $|x| + |y| = 1$, r. 4 sq. units Area bounded by the curves $y = \left[\frac{x^2}{64} + 2\right](where[.]de \neg es$ the greatest integer function), $y = x - 1 and x = 0$ above the x-axis., s. 2/3 sq. units

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67. The area enclosed by the curve $c : y = x\sqrt{9 - x^2}(x \geq 0)$ and the x-axis is_______

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68. The area bounded by the curves $y = x(x-3)^2 andy = x$ is______ (in sq. units)

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69. Column I, Column II Area enclosed , q. 1. sq. units The smaller area included between the curves $\sqrt{x} + \sqrt{|y|} = 1$ and $|x| + |y| = 1$, r. 4 sq. units Area bounded by the curves $y = \left[\frac{x^2}{64} + 2\right] (where[.]de \neg es$ the greatest integer function), $y = x - 1 andx = 0$ above the x-axis., s. 2/3 sq. units

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70. Consider two regions: R_1: Point P is nearer to $(1, 0)$ then to $x = -1$. R_2: Point P is nearer to $(0, 0)$ then to $(8, 0)$. Then which of the following statements are true: $Statement1$: The area of the region common to R_1 and R_2 is $\frac{128}{3} sq\dot{u}nits. Statement2$: The area bounded by $x = 4\sqrt{y}$ and $y = 4$ is $\frac{32}{3} sq\dot{u}nits.$

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71. Statement 1 : The area bounded by $2 \geq max$ { |x-y|,|x+y| } is 8 sq. units.

Statement 2 : The area of the square of side length 4 is 16 sq. units.

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72. Statement 1 : The area enclosed between the parabolas $y^2 - 2y + 4x + 5 = 0$ and $x^2 + 2x - y + 2 = 0$ is same as that of bounded by curves $y^2 = -4xandx^2 = y$. Statement 2 : Shifting of origin to point (h, k) does not change the bounded area.

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73. If the area bounded by the corve $y = x^2 + 1, y = x$ and the pair of lines $x^2 + y^2 + 2xy - 4x - 4y + 3 = 0$ is K units, then the area of the region bounded by the curve $y = x^2 + 1, y = \sqrt{x - 1}$ and the pair of lines $(x + y - 1)(x + y - 3) = 0$ is

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74. Let S be the area bounded by the curve $y = \sin x (0 \leq x \leq \pi)$ and the x-axis and T be the area bounded by the curves $y = \sin x \left(0 \leq x \leq \frac{\pi}{2}\right), y = a \cos x \left(0 \leq x \leq \frac{\pi}{2}\right)$, and the x-axis $\left(where a \in R^{+}\right)$ The value of $(3a)$ such that $S : T = 1 : \frac{1}{3}$ is______

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75. Let C be a curve passing through $M(2, 2)$ such that the slope of the tangent at anypoint to the curve is reciprocal of the ordinate of the point. If the area bounded by curve C and line x=2 is A ,then the value of $\frac{3A}{2}$ i s__`

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76. Let $f(x)$ be continuous function given by $f(x) = \{2x, |x| \leq 1 \text{and}$ $x^2 + ax + b, |x| > 1\}$.

Find the area of the region in the third quadrant bounded by the curves $x = -2y^2 and y = f(x)$ lying on the left of the line $8x + 1 = 0$.

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77. Let $C_1 C_2$ be the graphs of the functions $y = x^2$ and $y = 2x$, respectively, where $0 \leq x \leq 1$. Let C_3 be the graph of a function $y = f(x)$, where $0 \leq x \leq 1, f(0) = 0$. For a point P on C_1, let the lines through P, parallel to the axis, meet C_2 and C_3 at Q and R, respectively (see Figure). If for every position of $P(on C_1)$, the areas of the shaded regions OPQ and ORP are equal, determine the function $f(x)$

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78. Find the area bounded by the curve $x^2 = 4y$ and the line x = 4y - 2.

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79. The area of the region bounded by the curves $y = x^2, y = \left|2 - x^2\right|$ and y=2 which lies to the right of the line x=1, is

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80. If $\begin{bmatrix}4a^2 & 4a & 1\\ 4b^2 & 4b & 1\\ 4c^2 & 4c & 1\end{bmatrix}\begin{bmatrix}f(-1)\\ f(1)\\ f(2)\end{bmatrix} = \begin{bmatrix}3a^2+3a\\ 3b^2+3b\\ 3c^2+3c\end{bmatrix}$, $f(x)$ is a quadratic function and its maximum value occurs at a point V. A is a point of intersection of $y = f(x)$ with x-axis and point B is such that chord AB subtends a right angled at V. Find the area enclosed by $f(x)$ and chord AB.

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81. If f(x) is a function such that f'(x)=$(x-1)^2(4-x)$, then

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82. The area bounded by the curves $y = |x| - 1 and y = -|x| + 1$ is 1 sq. units (b) 2 sq. units $2\sqrt{2}$ sq. units (d) 4 sq. units

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83. If the area bounded by the curve y=f(x), x-axis and the ordinates x=1 and x=b is (b-1) $\sin$(3b+4), then find f(x).

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84. The area bounded by the parabolas $y = (x+1)^2$ and $y = (x-1)^2 and y = (x-1)^2$ and the line $y = \frac{1}{4}$ is

(a)4 sq. units (b) 1/6 sq. units 4/3 sq. units (d) 1/3 sq. units

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85. The area bounded by the curves $y = \sqrt{x}, 2y + 3 = x,$ and x-axis in the 1st quadrant is (A) 18 sq. units (B) $\frac{27}{4}$ sq.units (C) $\frac{4}{3}$ sq.units (D) 9 sq. units

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86. Find the area bounded by $y = \tan^{-1} x, y = \cot^{-1} x$, and y-axis in the first quadrant.

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87. the equation to the director circle of $\frac{x^2}{6} + \frac{y^2}{4} = 1$ is

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88. Find the area bounded by $y = \log_e x, y = -\log_e x, y = \log_e(-x), andy = -\log_e(-x)\cdot$

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89. The area of region for which $0 < y < 3 - 2x - x^2$ and $x > 0$ is

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90. The area common to regions $x^2 + y^2 - 2x \leq 0$ and $y \geq \sin\left(\pi \frac{x}{2}\right)$

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91. Draw the rough sketch of the curve $y = x^4 - x^2$.

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92. $f(x)$ is a continuous and bijective function on R. If $\forall t \in R$, then the area bounded by $y = f(x), x = a - t, x = a,$ and the x-axis is equal to the area bounded by $y = f(x), x = a + t, x = a,$ and the x-axis. Then prove that $\int_{-\lambda}^{\lambda} f^{-1}(x)dx = 2a\lambda(giventhat f(a) = 0)\cdot$

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93. Find the continuous function f where $(x^4 - 4x^2) \leq f(x) \leq (2x^2 - x^3)$ such that the area bounded by $y = f(x), y = x^4 - 4x^2.$ then y-axis, and the line $x = t,$ where $(0 \leq t \leq 2)$ is k times the area bounded by $y = f(x), y = 2x^2 - x^3$,y-axis ,and line $x = t(where 0 \leq t \leq 2)\cdot$

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94. Find the area bounded by the curves $y = -x^2 + 6x - 5, y = -x^2 + 4x - 3,$ and the straight line $y = 3x - 15 and$ lying right to $x = 1.$

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95. Find the value of a where $(a > 2)$ for which the reciprocal of the area enclosed between $y = \frac{1}{x^2}, y = \frac{1}{4(x-1)}, x = 2, andx = a$ is a itself and for what values of $b \in (1, 2)$, the area of the figure bounded by the lines $x = bandx = 2is1 - \frac{1}{b}$.

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96. if $A_1, A_2, A_3, \ldots. A_{100}$are set of $A_1 \subset A_2 \subset A_3 \subset A_4 \ldots. \subset A_{100}$ $n(A_i) = i + 2$, $\cap_{i=3}^{100} A_i$ =

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97. Draw the rough sketch of $y^2 + 1 = x, \ x \leq 2.$ Find the area enclosed by the curve and the line $x = 2.$

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98. Each question has four choices a,b,c and d, out of which only one is correct. Each question contains STATEMENT 1 and STATEMENT 2. If both the statements are TRUE and STATEMENT 2 is the correct explanation of STATEMENT 1 If both the statements are TRUE but STATEMENT 2 is NOT the correct explanation of STATEMENT 1. If STATEMENT 1 is TRUE and STATEMENT 2 is FALSE. If STATEMENT 1 is FALSE and STATEMENT 2 is TRUE. Statement 1 : The area bounded by $y = e^x, y = 0 and x = 0$ is 1 sq. unites. Statement 2 : The area bounded by $y = (\log)_e x, x = 0, and y = 0$ is 1 sq. units.

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99. If $A_1, A_2, A_3, ..$ are sets such that $n(A_i) = 101 - i$, $A_1 \supset A_2 \supset A_3 \supset ... \supset A_{100}$ and $A = \cap_{i=5}^{100} A_i$ then n(A) is equal to

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100. Let $A(k)$ be the area bounded by the curves $y = x^2 - 3$ and $y = kx + 2$

(a) The range of $A(k)$ is $\left(\frac{10\sqrt{5}}{3}, \infty\right)$

(b) The range of $A(k)$ is $\left(\frac{20\sqrt{5}}{3}, \infty\right)$

(c) If function $k \to A(k)$ is defined for $k \in [-2, \infty)$, then $A(k)$ is many-one function.

(d) The value of k for which area is minimum is 1.

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101. $\int (ax^2 + bx + c)\,dx$ =

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102. Find a continuous function f, where $(x^4 - 4x^2) \leq f(x) \leq (2x^2 - x^3)$ such that the area bounded by $y = f(x), y = x^4 - 4x^2,$ the y-axis, and the line

$x = t,$ where $(0 \leq t \leq 2)$ is k times the area bounded by $y = f(x), y = 2x^2 - x^3,$ y-axis, and line $x = t(\text{where } 0 \leq t \leq 2).$

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103. The parabolas $y^2 = 4x and x^2 = 4y$ divide the square region bounded by the lines $x = 4, y = 4$ and the coordinate axes. If S_1, S_2, S_3 are the areas of these parts numbered from top to bottom, respectively, then

(a)$S_1 : S_2 \equiv 1 : 1$ (b) $S_2 : S_3 \equiv 1 : 2$ $S_1 : S_3 \equiv 1 : 1$ (d) $S_1 : (S_1 + S_2) = 1 : 2$

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104. Statement 1 : The area bounded by parabola $y = x^2 - 4x + 3 and y = 0$ is $\frac{4}{3}$ sq. units.

Statement 2 : The area bounded by curve $y = f(x) \geq 0 and y = 0$ between ordinates $x = a and x = b$ (where $b > a$) is $\int_a^b f(x) dx$

(a) statement 1 is true, statement 2 is true, Statement 2 is the correct explanation for statement 1.

(b) statement 1 is true, statement 2 is true, Statement 2 is not correct explanation for statement 1.

(c) statement 1 is true, statement 2 is not true.

(d) statement 2 is true, statement 1 is not true.

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105. $f(x)$ is a polynomial of degree 3 passing through the origin having local extrema at $x = \pm 2$ Statement 1 : Ratio of areas in which $f(x)$ cuts the circle $x^2 + y^2 = 36 is 1 : 1$. Statement 2 : Both $y = f(x)$ and the circle are symmetric about the origin.

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106. $\int x^2 \left(1 - \frac{1}{x^2}\right)$dx =

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107. The value of $a(a > 0)$ for which the area bounded by the curves $y = \frac{x}{6} + \frac{1}{x^2}, y = 0, x = a, and x = 2a$ has the least value is__

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108. Area bounded by the relation $[2x] + [y] = 5, x, y > 0$ is___

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109. -q, and d-s, then the correctly bubbled $4x4$ matrix should be as follows: Figure: of the region lying between the lines $x - y + 2 = 0, x = 0$ and the curve $x = \sqrt{y}$, q. 64/3 sq. units The area enclosed between the curves $y^2 = x and y = |x|$, r. 2/3 sq. units The area bounded by parabola $y^2 = x,$ straight line $y = 4, and they - a\xi s$, s. 1/6 sq. units

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110. If the area of the region $\{(x, y) : 0 \leq y \leq x^2 + 1, 0 \leq y \leq x + 1, 0 \leq x \leq 2\}$ is A , then the value of $3A - 17$ is____

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111. The area enclosed by $f(x) = 12 + ax - x^2$ coordinates axes and the ordinates at $x = 3(f(3) > 0)$ is 45 sq. units. If $mandn$ are the x-axis intercepts of the graph of $y = f(x)$, then the value of $(m + n + a)$ is____

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112. If the area bounded by the curve $f(x) = x^{\frac{1}{3}}(x - 1)$ and the x-axis is A, then the value of $28A$ is____

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113. If the area bounded by the curve $y = x^2 + 1$ and the tangents to it drawn from the origin is $A,$ then the value of $3A$ is__-

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114. If the area enclosed by the curve $y = \sqrt{x}$ and $x = -\sqrt{y}$, the circle $x^2 + y^2 = 2$ above the x-axis is $A,$ then find the value of $\frac{16}{\pi}A$

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115. If S is the sum of possible values of c for which the area of the figure bounded by the curves $y = \sin 2x,$ the straight lines $x = \frac{\pi}{6}, x = c,$ and the abscissa axis is equal to $\frac{1}{2},$ then the value of π / S is____

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116. If A is the area bounded by the curves $y = \sqrt{1 - x^2}$ and $y = x^3 - x$. then find the value of $\frac{\pi}{A}$.

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117. A curve is given by $y = \left\{\left(\sqrt{4 - x^2}\right), 0 \leq x < 1 \text{ and } \sqrt{(3x)}, 1 \leq x \leq 3.\right.$ Find the area lying between the curve and x-axis.

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118. Find the area enclosed by the curves $x^2 = y, y = x + 2$ and x-axis

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119. Find the area of the region bounded by the curves $y = x^2 + 2, y = x, x = 0, andx = 3.$

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120. Find the area of that part of the circle $\mathrm{x}^2 + \mathrm{y}^2 = 16$ which is exterior to the parabola $\mathrm{y}^2 = 6\mathrm{x}$.

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121. Find the area bounded by the y-axis, $y = \cos x$,and $y = \sin x$ when $0 \leq x \leq \frac{\pi}{2}$.

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122. Find the area lying in the first quadrant and bounded by the curve $y = x^3$ and the line $y = 4x$.

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123. If the area enclosed by curve $y = f(x) andy = x^2 + 2$ between the abscissa $x = 2 andx = \alpha, \alpha > 2$, is $\left(\alpha^3 - 4\alpha^2 + 8\right) sq$. unit. It is known that curve $y = f(x)$ lies below the parabola $y = x^2 + 2$.

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124. Plot the region in the first quadrant in which points are nearer to the origin than to the line $x = 3$.

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125. Find the area bounded by the curve $y = \sin^{-1} x$ and the line $x = 0, |y| = \frac{\pi}{2}$.

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126. Find the area of the region bounded by the limits $x = 0, x = \frac{\pi}{2}, and f(x) = \sin x, g(x) = \cos x$.

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127. The area bounded by $y = \sec^{-1} x, y = \cos ec^{-1} x,$ and line $x - 1 = 0$ is (a) $\log(3 + 2\sqrt{2}) - \frac{\pi}{2}$ sq. units (b) $\frac{\pi}{2} - \log(3 + 2\sqrt{2})$ sq. units (c) $\pi - (\log)_e 3$ sq. units (d) non of these

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128. The area of the region whose boundaries are defined by the curves y= $2 \cos x, y =$ 3tanx and the y-axis is (a) $1 + 31n\left(\frac{2}{\sqrt{3}}\right) squnits$ (b) $1 + \frac{3}{2}1n3 - 31n2squnits$ (c)$1 + \frac{3}{2}1n3 - 1n2squnits$ (d) $1n3 - 1n2squnits$

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129. Area bounded by the curve $xy^2 = a^2(a - x)$ and the y-axis is $\frac{\pi a^2}{2} squnits$ (b) $\pi a^2 squnits$ $3\pi a^2 squnits$ (d) None of these

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130. The area of the closed figure bounded by $x = -1, y = 0, y = x^2 + x + 1,$ and the tangent to the curve $y = x^2 + x + 1$ at $A(1, 3)$ is (a) $\frac{4}{3}$ sq. units (b) $\frac{7}{3}$ sq. units (c) $\frac{7}{6}$ sq. units (d) none of these

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131. The area of the closed figure bounded by $y = \frac{x^2}{2} - 2x + 2$ and the tangents to it at $\left(1, \frac{1}{2}\right)$ and $(4, 2)$ is (A) $\frac{9}{8}$ sq.unit (B) $\frac{3}{8}$ sq.units (C) $\frac{3}{2}$ sq.units (D) $\frac{9}{4}$ sq.units

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132. The area of the closed figure bounded by $x = -1, x = 2, and$ $y = \{-x^2 + 2, x \leq 12x - 1, x > 1$and the ascissa axis is (a) $\frac{16}{3} s\dot{q}units$ (b) $\frac{10}{3} s\dot{q}units$ (c) $\frac{13}{3} s\dot{q}units$ (d) $\frac{7}{3} s\dot{q}units$

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133. The area between the curve $y = 2x^4 - x^2$, the axis, and the ordinates of the two minima of the curve is 11/60 sq. units (b) 7/120 sq. units 1/30 sq. units (d) 7/90 sq. units

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134. The area bounded by the curve $a^2y = x^2(x + a)$ and the x-axis is $\frac{a^2}{3}s\dot{q}u\dot{n}its$ (b) $\frac{a^2}{4}s\dot{q}u\dot{n}its$ $\frac{3a^2}{4}s\dot{q}u\dot{n}its$ (d) $\frac{a^2}{12}s\dot{q}u\dot{n}its$

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135. Find the area bounded by the curve $x^2 = 4y$ and the line x = 4y - 2.

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136. If S is the sum of cubes of possible value of c for which the area of the figure bounded by the curve $y = 8x^2 - x^5$, then straight lines

$x = 1 and x = c$ and the abscissa axis is equal to $\frac{16}{3}$, then the value of $[S], where[.]$ denotest the greatest integer function, is____

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137. The area of the smaller region bounded by circle $x^2 + y^2 = 1$ and $|y| = x + 1$ (a)$\frac{\pi}{2} - \frac{1}{2} sq\dot{u}nits$ (b) $\frac{\pi}{2} - 1 sq\dot{u}nits$ (c) $\frac{\pi}{2} sq\dot{u}nits$ (d) $\frac{\pi}{2} + 1 sq\dot{u}nits$

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138. $\int \frac{e^{2x} - 1}{e^{2x} + 1} dx$ is equal to -

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139. Sketch the region bounded by the curves $y = \sqrt{5 - x^2}$ and $y = |x - 1|$ and find its area.

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140. Find the area of the region bounded by the x-axis and the curves defined by $y = \tan x \left(where - \frac{\pi}{3} \leq x \leq \frac{\pi}{3}\right)$ and $y = \cot x \left(where \frac{\pi}{6} \leq x \leq \frac{3\pi}{2}\right)$.

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141. Find the area bounded by the x-axis, part of the curve $y = \left(1 + \frac{8}{x^2}\right)$, and the ordinates at $x = 2 and x = 4.$ If the ordinate at $x = a$ divides the area into two equal parts, then find $a \cdot$

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142. Given $A = \begin{bmatrix} 5 & 0 & 4 \\ 2 & 3 & 2 \\ 1 & 2 & 1 \end{bmatrix}$, $B^{-1} = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$. Compute $(AB)^{-1}$.

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143. Find the area bounded by the curves $x^2 + y^2 = 25$, $4y = |4 - x^2|$, and $x = 0$ above the x-axis.

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