MATHS

BOOKS - CENGAGE MATHS (HINGLISH)

APPLICATION OF INTEGRALS

Solved Examples And Exercises

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

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. π

D. 2π

Answer: B

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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.

A. $k = 1$

B. $k = 2$

C. $k = 3$

D. $k = 4$

Answer: B

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

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5. Let $f(x)=\text{minimum}\left(x+1,\sqrt{1-x}\right)$ for all $x\le 1$. 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

Answer: D

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6. The area inside the parabola $5x^2 - y = 0$ but outside the parabola $2x^2 - y + 9 = 0$ is $12\sqrt{3}squnits$ $6\sqrt{3}squnits$ $8\sqrt{3}squnits$ (d) $4\sqrt{3}squnits$

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7. If A_n is the area bounded by $y = xandy = x^n, n \in N, thenA_2\dot{A}_3A_n =$ $\frac{1}{n(n+1)}$ (b) $\frac{1}{2^{\cap}(n+1)}$ $\frac{1}{2^{n-1}n(n+1)}$ (d) $\frac{1}{2^{n-2}n(n+1)}$

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8. Area enclosed between the curves $|y| = 1 - x^2andx^2 + y^2 = 1$ is $\frac{3\pi - 8}{3}$ (b) $\frac{\pi - 8}{3}$ $\frac{2\pi - 8}{3}$ (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 $2s\dot{q}units$ (b) $1s\dot{q}units$ $4s\dot{q}units$ (d) none of these

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11. If A_n be the area bounded by the curve $y = (\tan x^n)$ ands the lines $x = 0,\ y = 0,\ x = \pi/4$, then for $x > 2.$ $A_n + A_{n-1} = \frac{1}{n-1}$ b. $A_n + A_{n-2} < \frac{1}{n-1}$ c. $A_n + A_{n-2} = \frac{1}{n-1}$ d. none of these

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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 $O(0, 0), A(2, 0), andB\left(1\frac{1}{\sqrt{3}}\right)$ be the vertices of a triangle. Let R be the region consisting of all those points P inside OAB which satisfy $d(P, OA) \leq \min\left[d(p, OB), d(P, AB)\right]$, 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 $4\pi sq units$ (b) $8\pi sq units$ $4 sq units$ (d) $8 sq units$

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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 $\sqrt{x - 1}$ (b) $\sqrt{x + 1}$ $\sqrt{x^2 + 1}$ (d) $\frac{x}{\sqrt{1 + x^2}}$

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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) $\left(\frac{\pi}{4} + \sqrt{2} - 1\right)$ $-\frac{\pi}{2}$ (d) $\left(1 - \frac{\pi}{4} - \sqrt{2}\right)$

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18. The area bounded by the curves $y = \sin^{-1}|\sin x| and y = \left(\sin^{-1}|\sin x|^2, where 0 \leq x \leq 2\pi,\right.$ is $\frac{1}{3} + \frac{\pi^2}{4} sq\dot{u}nits$ (b) $\frac{1}{6} + \frac{\pi^3}{8} sq\dot{u}nits$ $2 sq\dot{u}nits$ (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 $\frac{1}{5} sq\dot{u}nits$ (b) $\frac{3}{5} sq\dot{u}nits$ $\frac{4}{5} sq\dot{u}nits$ (d) $\frac{8}{4} sq\dot{u}nits$

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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 $8 squnits$ (b) $2 squnits$ $4\pi squnits$ (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 $x = -2 and x = 6$ is $\frac{1}{4} squnits$ (b) $\frac{4}{3} squnits$ $\frac{5}{4} squnits$ (d) $\frac{7}{3} squnits$

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23. Consider two curves $C_1 : y^2 = 4\left[\sqrt{y}\right] x and C_2 : x^2 = 4\left[\sqrt{x}\right] y$, 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 $\frac{8}{3} squnits$ (b) $\frac{10}{3} squnits$ $\frac{11}{3} squnits$ (d) $\frac{11}{4} squnits$

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24. The area enclosed between the curve $y^2(2a - x) = x^3$ and the line $x = 2a$ above the x-axis is (a) $\pi a^2 squnits$ (b) $\frac{3\pi a^2}{2} squnits$ (c) $2\pi a^2 squnits$ (d) $3\pi a^2 squnits$

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25. The area of the region of the plane bounded by $\max(|x|, |y|) \leq 1 and xy \leq \frac{1}{2}$ is $\frac{1}{2} + 1n2 squnits$ (b) $3 + 1n2 squnits$ $\frac{31}{4} squnits$ (d) $1 + 21n2 squnits$

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26. 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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27. The area of the loop of the curve $ay^2 = x^2(a-x)$ is $(a)4a^2 squnits$ (b) $\frac{8a^2}{15} squnits$ $\frac{16a^2}{9} squnits$ (d) None of these

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

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29. If $f(x) = \sin x,\ \forall x \in \left[0, \frac{\pi}{2}\right],\ f(x) + f(\pi - x) = 2,\ \forall x \in \left(\frac{\pi}{2}, \pi\right) and f(x)$ then the area enclosed by $y = f(x)$ and the x-axis is $\pi squnits$ (b) $2\pi squnits$ $2squnits$ (d) $4squnits$

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

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

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33. The area bounded by the loop of the curve $4y^2 = x^2(4-x^2)$ is 7/3 sq. units (b) $\frac{8}{3}s\dot{q}unites$ $\frac{11}{3}s\dot{q}units$ (d) $\frac{16}{3}s\dot{q}units$

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34. The area of the region enclosed between the curves $x = y^2 - 1andx = |y|\sqrt{1-y^2}$ is $1s\dot{q}units$ (b) $\frac{4}{3}s\dot{q}units$ $\frac{2}{3}s\dot{q}units$ (d) $2s\dot{q}units$

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35. 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 $4\left(\sqrt{2}-2\right)$ (b) $2\sqrt{2}$ ($\sqrt{2}$ -1) $2\left(\sqrt{2}\right.$ +1) (d) $2\sqrt{2}\left(\sqrt{2}+1\right)$

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

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

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

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41. Consider two curves $C_1 : y = \frac{1}{x} and C_2 : y = 1nx$ 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 $x = a\cdot$ If $D_1 = D_2,$ then the sum of logarithm of possible value of a is __________

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42. 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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43. 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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44. Find the area of the region enclosed by the curves $y = x \log x and y = 2x - 2x^2$.

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

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

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

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48. Find the area bounded by $x = 2y - y^2 andthey - a\xi s\cdot$

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49. Find the area bounded by $y = \sin^{-1} x, y = \cos^{-1} x, andthex - a\xi s\cdot$

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50. Find the ratio in which the area bounded by the curves $y^2 = 12x$ and $x^2 = 12y$ is divided by the line $x = 3$.

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51. Find the area bounded by a . $y = (\log)_e |x| andy = 0$ b $y = |(\log)_3 |x| \quad | andy = 0$

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

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53. Sketch the region bounded by the curves $y = x^2 andy = \frac{2}{1 + x^2}$.

Find the area.

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54. Find the area of the region bounded by the curve $C: y = \tan x, tan \geq ntdrawn \to C$ at $x = \frac{\pi}{4}$, and the x-axis.

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

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

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57. Find the area bounded by the curves $y = s \in xandy = \cos x$ between two consecutive points of the intersection.

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

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

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61. Find the area, lying above the x=axis and included between the circle $x^2 + y^2 = 8x$ and the parabola $y^2 = 4x$.

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

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

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

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66. 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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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. 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 $(8, 0)$ Statement 1 : The area of the region common to $R_1 and R_2$ is $\frac{128}{3} sq \dot{u} nits$ Statement 2 : The area bounded by $x = 4\sqrt{y} and y = 4$ is $\frac{32}{3} sq \dot{u} nits$

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69. Statement 1 : The area bounded by $2 \geq max|x - \dot{y}|, |x|y|$ is 8 sq. units. Statement 2 : The area of the square of side length 4 is 16 sq. units.

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70. 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 $y^2 = -4x and x^2 = y$. Statement 2 : Shifting of origin to point (h, k) does not change the bounded area.

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71. Statement 1 : The area of the region bounded by the curve $2y = (\log)_e x, y = e^{2x}$, and the pair of lines $(x + y - 1)x(x + y - 3) = 0 is 2k sq units$ Statement 2 : The area of the region bounded by the curves $2y = (\log)_e x, y = e^{2x}$, and the pair of lines $x^2 + y^2 + 2xy - 4x - 4y + 3 = 0$ is k units.

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72. 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 $y = \sin x \left(0 \leq x \leq \frac{\pi}{2}\right), ya \cos x \left(0 \leq x \leq \frac{\pi}{2}\right)$, 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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73. 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 lin x=2i s A ,t h e nt h e v a l u e of $\frac{3A}{2}$i s__`

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74. Let $f(x)$ be continuous function given by $f(x) = \{2x, |x| \leq 1x^2 + ax + b, |x| > 1\}$. Find the area of the region in the third quadrant bounded by the curves $x = -2y^2 andy = f(x)$ lying on the left of the line $8x + 1 = 0$.

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75. Find the area bounded by the curves $x^2 = y$, $x^2 = -y$ and $y^2 = 4x - 3$

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

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77. 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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78. 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-

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79. 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 4 sq. units (b) 1/6 sq. units 4/3 sq. units (d) 1/3 sq. units

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

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82. Prove that area common to ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and its auxiliary circle $x^2 + y^2 = a^2$ is equal to the area of another ellipse of semi-axis $aanda - b\cdot$

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83. 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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84. the area of region for which $0 < y < 3 - 2x - x^2$ and $x > 0$ is

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

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86. Draw a rough sketch of the curve $y = \frac{x^2 + 3x + 2}{x^2 - 3x + 2}$ and find the area of the bounded region between the curve and the x-axis.

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87. $f(x)$ 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 $\int_{-\lambda}^{\lambda} f^{-1}(x)dx = 2a\lambda(given that f(a) = 0)$.

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88. 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 $y = f(x), y = 2x^2 - x^3, y - a\xi s$, and line $x = t(where 0 \leq t \leq 2)$.

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

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91. The area enclosed by the curves $x = a\sin^3 t and y = a\cos^3 t$ is equal to (A)$12a^2\int_0^{\frac{\pi}{2}}\cos^4 t\sin^2 t dt$ (B) $12a^2\int_0^{\frac{\pi}{2}}\cos^2 t\sin^4 t dt$ (C) $2\int_{-a}^{a}\left(a^{\frac{2}{3}} - x^{\frac{2}{3}}\right)^{\frac{3}{2}}dx$ (D) $4\int_0^{a}\left(a^{\frac{2}{3}} - x^{\frac{2}{3}}\right)^{\frac{3}{2}}dx$

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92. If the curve $y = ax^{\frac{1}{2}} + bx$ passes through the point $(1, 2)$ and lies above the x-axis for $0 \leq x \leq 9$ and the area enclosed by the curve, the x-axis, and the line $x = 4$ is 8 sq. units, then $a = 1$ (b) $b = 1$ $a = 3$ (d) $b = -1$

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93. 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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94. 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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95. Let $A(k)$ be the area bounded by the curves $y = x^2 - 3$ and $y = kx + 2$ The range of $A(k)$ is $\left(\frac{10\sqrt{5}}{3}, \infty\right)$ The range of $A(k)$ is $\left(\frac{20\sqrt{5}}{3}, \infty\right)$ If function $k\vec{A}(k)$ is defined for $k \in [-2, \infty)$, then $A(k)$ is many-one function. The value of k for which area is minimum is 1.

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96. The area bounded by the curve $y^2 = 1 - x$ and the lines $y = \frac{|x|}{x}, x = -1, and x = \frac{1}{2} is$ $\frac{3}{\sqrt{2}} - \frac{11}{6} sq units$ (b) $3\sqrt{2} - \frac{11}{4} sq units$ $\frac{6}{\sqrt{2}} - \frac{11}{5} sq units$ (d) none of these

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97. Which of the following have the same bounded area

$f(x) = s \in x, g(x) = \sin^2 x, where 0 \le x \le 10\pi$

$f(x) = s \in x, g(x) = |s \in x|, where 0 \le x \le 20\pi$

$f(x) = |s \in x|, g(x) = \sin^3 x, where 0 \le x \le 10\pi$

$f(x) = s \in x, g(x) = \sin^4 x, where 0 \le x \le 10\pi$

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98. 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 $S_1 : S_2 \equiv 1 : 1$ (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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99. 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 $\int_a^b f(x) dx$

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100. $f(x)$ 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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101. 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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102. Area bounded by the relation $[2x] + [y] = 5, x, y > 0$ is___

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

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104. 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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105. 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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106. 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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107. 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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108. 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 the value of $\frac{16}{\pi}A$ is___

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109. If S is the sum of possible values of c for which the area of the figure bounded by the curves $y = s \in 2x$, 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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110. If A is the area bounded by the curves $y = \sqrt{1 - x^2}$ and $y = x^3 - x$, then of $\frac{\pi}{A}$.

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111. 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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112. Find the area enclosed by the curves $x^2 = y, y = x + 2, andx - a\xi s.$

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

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

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115. Find the area bounded by the y-axis, $y = \cos x, andy = \sin xwhen0 \leq x \leq \frac{\pi}{2}.$

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

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

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120. 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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121. 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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122. The area of the region whose boundaries are defined by the curves $y = 2\cos x, y = 3\tan x, andthey - a\xi sis$ $1 + 31n\left(\frac{2}{\sqrt{3}}\right)squ\dot{n}its$ $1 + \frac{3}{2}1n3 - 31n2squ\dot{n}its$ $1 + \frac{3}{2}1n3 - 1n2squ\dot{n}its$ $1n3 - 1n2squ\dot{n}its$

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

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124. 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) non of these

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125. 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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126. The area of the closed figure bounded by $x = -1, x = 2, and$ $y = \{ -x^2 + 2, x \leq 12x - 1, x > 1 and the abscissa a \xi s is \frac{16}{3} sq\dot{u}nits$ (b) $\frac{10}{3} sq\dot{u}nits$ $\frac{13}{3} sq\dot{u}nits$ (d) $\frac{7}{3} sq\dot{u}nits$

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127. 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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128. The area bounded by the curve $a^2y=x^2(x+a)$ and the x-axis is $\frac{a^2}{3}\dot{squnits}$ (b) $\frac{a^2}{4}\dot{squnits}$ $\frac{3a^2}{4}\dot{squnits}$ (d) $\frac{a^2}{12}\dot{squnits}$

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129. The area of the region bounded by the curve $x^2=4y$ and the straight line $x=4y-2$ is

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130. 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 $x=1andx=c$ 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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131. The area of the region bounded by $x^2 + y^2 - 2x - 3 = 0$ and $y = |x| + 1 \frac{\pi}{2} - 1 squnits$ (b) $2\pi squnits$ $4\pi squnits$ (d) $\frac{\pi}{2} squnits$

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132. The value of the parameter a such that the area bounded by $y = a^2 x^2 + ax + 1,$ coordinate axes, and the line $x = 1$ attains its least value is equal to $\frac{1}{4} squnits$ (b) $\frac{1}{2} squnits$ $\frac{3}{4} squnits$ (d) $-1 squnits$

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

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134. 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 $y = \cot x \left(where \frac{\pi}{6} \leq x \leq \frac{3x}{2}\right)$.

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135. 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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136. For any real t, $x = \frac{1}{2}\left(e^t + e^{-t}\right), y = \frac{1}{2}\left(e^t - e^{-t}\right)$ is a point on the hyperbola $x^2 - y^2 = 1$ Show that the area bounded by the hyperbola and the lines joining its centre to the points corresponding to $t_1 and - t_1$ is$t_1 \cdot$

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137. 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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