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## MATHS

## BOOKS - CENGAGE MATHS (ENGLISH)

## APPLICATION OF INTEGRALS

## Others

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

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2. If the area by $y=x^{2}+2 x-3$ and the line $y=k x+1$ is the least, find $k$ and also the least area.
3. Area enclosed by the curve $y=f(x)$ defined parametrically as $x=\frac{1-t^{2}}{1+t^{2}}, y=\frac{2 t}{1+t^{2}}$ 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 $|\mathrm{x}|+|\mathrm{y}|=\mathrm{a}^{`}$ divides the area in two parts, then find their ratio in the first quadrant only.

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5. Let $f(x)=\min (x+1, \sqrt{1-x})$ 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 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) $\frac{1}{2^{n-1} n(n+1)}$
$\frac{1}{2^{n-2} n(n+1)}$

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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 $y=6 x-3 x^{2}$ 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) 2squinits (b) 1squinits (c) 4squinits $(\mathrm{d})$ 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 $y=x-b x^{2} a n d y=\frac{x^{2}}{b}$ is maximum.

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13. In the hexaploid wheat, the haploid ( n ) and basic ( x ) numbers of chromosomes are

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14. Let $O(0,0), A(2,0)$, $\operatorname{and} B\left(1 \frac{1}{\sqrt{3}}\right)$ be the vertices of a triangle. Let
$R$ be the region consisting of all those points $P$ inside $O A B$ which
satisfy $d(P, O A) \leq \min [d(p, O B), d(P, A B)]$, 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. A copper rod of mass $m$ rests on two horizontal rails distance $L$ apart and carries a current of I from one rail to the other. The coefficient of static friction between rod and rails is $\mu_{s}$ What are the (a) magnitude and (b) angle (relative to the vertical) of the smallest magnetic field that puts the rod on the verge of sliding?

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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. A particle moves along $x$-axis such that its position veries with time as $x=50 t-5 t^{2}$. Select the correct alternative (s).

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18. Masses $M_{1}, M_{2}$ and $M_{3}$ are connected by strings of negligible mass which pass over massless and frictionless pulleys $P_{1}$ and $P_{2}$ as shown in the figure. The masses move such that the portion of the string between $P_{1}$ and $P_{2}$ is parallel to the inclined plane and the portion of the string between $P_{2}$ and $M_{3}$ is horizontal. The masses $M_{2}$ and $M_{3}$ are 4.0 kg each and the coefficient of kinetic friction between both the masses and the
surfaces is 0.25 . The inclined plane makes an angle of $37^{\circ}$ with the horizontal. If the mass $M_{1}$ moves downwards with a uniform velocity, find
(i) the mass of $M_{1}$ in kg
(ii) the tension in the horizontal portion of the string in Newton


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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) $\frac{1}{5}$ squinits (b) $\frac{3}{5}$ squinits $\frac{4}{5}$ squinits (d) 8 ${ }_{4}$ squinits
20. The area bounded by the curves $y=\log _{e} x$ and $y=\left(\log _{e} x\right)^{2}$ 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)8squinits (b) 2squinits (c) $4 \pi$ squinits (d) $2 \pi$ squinits

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22. Let $f(x)=x^{3}+3 x+2 a n d g(x)$ be the inverse of it. Then the area bounded by $g(x)$, the x-axis, and the ordinate at $x=-2 a n d x=6$ is
(a) $\frac{9}{4}$ squinits (b) $\frac{4}{3}$ squinits (c) $\frac{5}{4}$ squinits (d) $\frac{7}{3}$ squinits

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23. Consider two curves $C_{1}: y^{2}=4[\sqrt{y}]$ xand $C_{2}: x^{2}=4[\sqrt{x}] y$, 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) $\frac{8}{3}$ squinits (b) $\frac{10}{3}$ squinits (c) $\frac{11}{3}$ squinits (d) $\frac{11}{4}$ squinits

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

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25. The area of the region of the plane bounded by $\max (|x|,|y|) \leq 1$ and $x y \leq \frac{1}{2}$ 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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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 $a y^{2}=x^{2}(a-x)$ is
A. (a) $4 a^{2}$ sq units
B. (b) $\frac{8 a^{2}}{15}$ squnits
C. (c) $\frac{16 a^{2}}{9}$ sq units
D. (d) None of these

## Answer: null

28. The area of the region bounded by $x=0, y=0, x=2, y=2, y \leq e^{x}$ and $y \geq 1 n x$ is (a) $6-41 n 2$ squinits (b) $41 n 2-2$ squinits $21 n 2-4$ squinits (d) $6-21 n 2$ squinits

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29. 

$f(x)=\sin x, \forall x \in\left[0, \frac{\pi}{2}\right], f(x)+f(\pi-x)=2, \forall x \in\left(\frac{\pi}{2}, \pi\right] \operatorname{andf}(x)$ then the area enclosed by $y=f(x)$ and the x -axis is
(a) $\pi$ sq. units
(b) $2 \pi$ sq • units
(c) 2 sq • units
(d) $4 \mathrm{sq} \cdot$ units
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 $y=x e^{x}, y=x e^{-x}$ and the lines $x=1$ is

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32. The area enclosed by the curves $x y^{2}=a^{2}(a-x)$ and $(a-x) y^{2}=a^{2} x$ is
33. The area bounded by the loop of the curve $4 y^{2}=x^{2}\left(4-x^{2}\right)$ is (a)7/3 sq. units (b) $\frac{8}{3}$ squinites $\frac{11}{3}$ squinits (d) $\frac{16}{3}$ squinits

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

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35. The area enclosed by the curve $y=\sin x+\cos$ xand $y=|\cos x-\sin x|$ 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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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 $y=m x$ 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 $\mathrm{x}=0$ 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 $d_{1}(P) a n d d_{2}(P)$ be the distances of the point $P$ from the lines $x-y=0 a n d x+y=0$ 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 $y=\frac{a^{2}-a x}{1+a^{4}}$ and the parabola $y=\frac{x^{2}+2 a x+3 a^{2}}{1+a^{4}}$ is the greatest, then the value of $a^{4}$ is

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41. Consider two curves $C_{1}: y=\frac{1}{x} a n d C_{2}: y=1 n x$ on the $x y$ plane. Let $D_{1}$ denotes the region surrounded by $C_{1}, C_{2}$, and the line $x=1 a n d D_{2}$ 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 $\qquad$

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42. Find the area bounded by $y^{2} \leq 4 x, x^{2}+y^{2} \geq 2 x$, $a n d x \leq y+2$ 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 $y=2 x-2 x^{2}$.

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45. Find the area of the region $\left\{(x, y): y^{2} \leq 4 x, 4 x^{2}+4 y^{2} \leq 9\right\}$
46. Find the area of the figure bounded by the parabolas $x=-2 y^{2}, x=1-3 y^{2}$.

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

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48. Find the area bounded by $x=2 y-y^{2}$ and the $y-a x i s$.

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

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50. Draw a rough sketch of the curve $\mathrm{y}=(x-1)^{2}(x-2)(x-3)^{3}$

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51. Find the area bounded by (a) $y=(\log )_{e}|x| a n d y=0$
$y=\left|(\log )_{e}\right| x|\quad|$ and $y=0$

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52. 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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53. Sketch the region bounded by the curves $y=x^{2}$ and $y=\frac{2}{1+x^{2}}$. Find the area.
54. Find the area of the region bounded by the curve $\mathrm{C}: \mathrm{y}=\tan \mathrm{x}$, tangent drawn to $C$ at $x=p i / 4$, and the $x$-axis.

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55. Compute the area of the region bounded by the curves
$y=e x(\log )_{e} x a n d y=\frac{\log x}{e x}$

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56. $A O B$ is the positive quadrant of the ellipse $\frac{x^{2}}{a^{2}}+\frac{y^{2}}{b^{2}}=1$ which has $O A=a, O B=b$. Then find the area between the arc $A B$ and the chord $A B$ of the ellipse.

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

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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 $\mathrm{y}=x^{2}+x$.

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61. Find the area, lying above the $x=a x i s$ and included between the circle $x^{2}+y^{2}=8 x$ and the parabola $y^{2}=4 x$.

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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 $y=e^{x} a n d y=1 n x$, 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 $x=0 \operatorname{andx}=3$.
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 $y=\sqrt{x}, y=\sqrt{4-3 x}$ 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 $\qquad$

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68. The area bounded by the curves $y=x(x-3)^{2}$ and $y=x$ is $\qquad$ (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 $\neg e s$ the greatest integer function), $y=x-1 a n d x=0$ above the $x$-axis., s. $2 / 3$ sq. units
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 $\frac{128}{3}$ squinits. Statement 2 : The area bounded by $x=4 \sqrt{y}$ and $y=4$ is $\frac{32}{3}$ squinits.

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71. Statement 1 : The area bounded by $2 \geq \max |x-y|,|x| y \mid$ 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 $y^{2}-2 y+4 x+5=0$ and $x^{2}+2 x-y+2=0$ is same as that of bounded by curves $y^{2}=-4 x a n d x^{2}=y$. 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 $x^{2}+y^{2}+2 x y-4 x-4 y+3=0$ 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 $y=\sin x\left(0 \leq x \leq \frac{\pi}{2}\right), y=a \cos x\left(0 \leq x \leq \frac{\pi}{2}\right), \quad$ and the $\quad x$-axis (wherea $\in R^{+}$) The value of ( $3 a$ ) such that $S: T=1: \frac{1}{3}$ is $\qquad$

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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 $\frac{3 A}{2}$ is

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

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

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77. Let $C_{1} C_{2}$ be the graphs of the functions $y=x^{2}$ and $y=2 x$, 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 $P\left(o n C_{1}\right)$, the areas of
the shaded regions $O P Q$ and $O R P$ are equal, determine the function $f(x)$

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

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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. At freezing point of a solution there is always
81. 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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82. If the area bounded by the curve $y=f(x), x-a x i s$ and the ordinates $x=1$ and $\mathrm{x}=\mathrm{b}$ is $(\mathrm{b}-1) \sin (3 \mathrm{~b}+4)$, then find $\mathrm{f}(\mathrm{x})$.

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83. 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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84. The area bounded by the curves $y=\sqrt{x}, 2 y+3=x$, 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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85. Find the area bounded by $y=\tan ^{-1} x, y=\cot ^{-1} x$, and $y$-axis in the first quadrant.

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

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$$
\begin{aligned}
& \text { 87. Find } \\
& y=\log _{e} x, y=-\log _{e} x, y=\log _{e}(-x), \text { and } y=-\log _{e}(-x)
\end{aligned}
$$

88. the area of region for which $0<y<3-2 x-x^{2}$ and $x>0$ is

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89. The area common to regions $x^{2}+y^{2}-2 x \leq 0$ and ygeq $\sin (\mathrm{pix} / 2)$

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90. Draw the rough sketch of the curve $y=x^{4}-x^{2}$.

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91. $f(x)$ 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 $\int_{-\lambda}^{\lambda} f^{-1}(x) d x=2 a \lambda($ giventhat $f(a)=0)$.

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92. Find the continuous function $f$ where $\left(x^{4}-4 x^{2}\right) \leq f(x) \leq\left(2 x^{2}-x^{3}\right)$ such that the area bounded by $y=f(x), y=x^{4}-4 x^{2}$. then $y$-axis, and the line $x=t$, where $(0 \leq t \leq 2)$ is $k$ times the area bounded by $y=f(x), y=2 x^{2}-x^{3}, y-$ axis, and line $x=t(w h e r e 0 \leq t \leq 2)$.

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

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

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95. if $A_{1}, A_{2}, A_{3}, \ldots . A_{100}$ are set of $A_{1} \supset A_{2} \supset A_{3} \supset A_{4} \ldots . . \supset A_{100}$ $n\left(A_{i}\right)=i+2, \cap_{i=3}^{100} A_{i}=$

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96. 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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97. 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 $y=e^{x}, y=0 a n d x=0$ is 1 sq. unites. Statement 2 : The area bounded by $y=(\log )_{e} x, x=0, a n d y=0$ is 1 sq. units.

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98. If $A_{1}, A_{2}, A_{3}, \ldots$ are sets such that $n\left(A_{i}\right)=101-i$, $A_{1} \supset A_{2} \supset A_{3} \supset \ldots \supset A_{100}$ and $A=\cap_{i=5}^{100} A_{i}$ then $\mathrm{n}(\mathrm{A})$ is equal to

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99. Let $A(k)$ be the area bounded by the curves $y=x^{2}-3$ and $y=k x+2$ 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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100. $\int\left(a x^{2}+b x+c\right) d x=$

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101. Find a continuous function f, where $\left(x^{4}-4 x^{2}\right) \leq f(x) \leq\left(2 x^{2}-x^{3}\right)$ such that the area bounded by $y=f(x), y=x^{4}-4 x^{2}, \quad$ the $y$-axis, and the line $x=t$, where $(0 \leq t \leq 2)$ is k times the area bounded by $y=f(x), y=2 x^{2}-x^{3}, y$-axis, and line $x=t($ where $0 \leq t \leq 2)$.
102. The parabolas $y^{2}=4 x a n d x^{2}=4 y$ 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 $\quad S_{1}: S_{2} \equiv 1: 1 \quad$ (b) $\quad S_{2}: S_{3} \equiv 1: 2 \quad S_{1}: S_{3} \equiv 1: 1$
$S_{1}:\left(S_{1}+S_{2}\right)=1: 2$

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103. Statement 1 : The area bounded by parabola $y=x^{2}-4 x+3 a n d y=0$ is $\frac{4}{3}$ sq. units. Statement 2 : The area bounded by curve $y=f(x) \geq 0$ andy $=0$ between ordinates $x=a a n d x=b($ where $b>a)$ is $\int_{a}^{b} f(x) d x$

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104. $f(x)$ 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 $x^{2}+y^{2}=36 i s 1: 1$. Statement 2: Both $y=f(x)$ and the circle are symmetric about the origin.

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

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

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107. Area bounded by the relation $[2 x]+[y]=5, x, y>0$ is
108. The area bounded by the curves $y=x(x-3)^{2}$ andy $=x$ is $\qquad$
(in sq. units)

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

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110. The area enclosed by $f(x)=12+a x-x^{2}$ 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 $\qquad$
111. 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 $28 A$ is $\qquad$

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112. 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 $3 A$ is_-

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113. 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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114. Which of the following abnormalities is due to $X$-linked recessive mutation?

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115. 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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116. 

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

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117. Find the area enclosed by the curves $x^{2}=y, y=x+2$ and $x$-axis
118. Find the area of the region bounded by the curves $y=x^{2}+2, y=x, x=0, a n d x=3$.

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119. 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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120. 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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121. Find the area lying in the first quadrant and bounded by the curve $y=x^{3}$ and the line $y=4 x$.

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122. If the area enclosed by curve $y=f(x) a n d y=x^{2}+2$ between the abscissa $x=2 a n d x=\alpha, \alpha>2$, is $\left(\alpha^{3}-4 \alpha^{2}+8\right) s q$. unit. It is known that curve $y=f(x)$ lies below the parabola $y=x^{2}+2$.

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

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

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126. The area bounded by $y=\sec ^{-1} x, y=\operatorname{cosec}^{-1} x$, 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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127. The area of the region whose boundaries are defined by the curves $y=$ $2 \cos x, y=3 \tan x$ and the $y$-axis is (a) $1+31 n\left(\frac{2}{\sqrt{3}}\right)$ squinits (b) $1+\frac{3}{2} 1 n 3-31 n 2$ squinits (c) $1+\frac{3}{2} 1 n 3-1 n 2$ squinits 1n3-1n2squinits

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128. A particle of mass $m$ is moving anticlockwise, in a circle of radius $R$ in $x-y$ plane with centre at $(R, 0)$ with a constant speed $v_{2}$. If is located at point $(2 R, 0)$ at time $t=0$. A man starts moving with a velocity $v_{1}$ along the positive $y$-axis from origin at $t=0$. Calculate the linear momentum of the particle w.r.t. man as a function of time.

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129. The area of the closed figure bounded by $x=-1, y=0, y=x^{2}+x+1, \quad$ 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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130. The area of the closed figure bounded by $y=\frac{x^{2}}{2}-2 x+2$ 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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131. The area of the closed figure bounded by $x=-1, x=2$, and $y=\left\{-x^{2}+2, x \leq 12 x-1, x>1\right.$ and the ascissa axis is $\frac{16}{3}$ sqünits (b) $\frac{10}{3}$ squinits (c) $\frac{13}{3}$ squinits (d) $\frac{7}{3}$ squinits

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132. The area between the curve $y=2 x^{4}-x^{2}$, 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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133. The area bounded by the curve $a^{2} y=x^{2}(x+a)$ and the $x$-axis is $\frac{a^{2}}{3}$ squinits (b) $\frac{a^{2}}{4}$ squinits $\frac{3 a^{2}}{4}$ squinits (d) $\frac{a^{2}}{12}$ squinits

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134. Find the area bounded by the curve $x^{2}=4 y$ and the straight line $x=4 y-2$.

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135. If $S$ is the sum of cubes of possible value of $c$ for which the area of the figure bounded by the curve $y=8 x^{2}-x^{5}$, then straight lines $x=1 a n d x=c$ and the abscissa axis is equal to $\frac{16}{3}$, then the value of [ $S$ ], where[.] denotest the greatest integer function, is $\qquad$

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136. The area of the smaller region bounded by circle $x^{2}+y^{2}=1$ and $|y|=x+1$ (a) $\frac{\pi}{2}-\frac{1}{2}$ squinits $\quad$ (b) $\frac{\pi}{2}-1$ squinits $\quad$ (c) $\frac{\pi}{2}$ squinits
$\frac{\pi}{2}+1$ squinits

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137. $\int \frac{e^{2 x}-1}{e^{2 x}+1} d x$ is eual to -

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

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

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

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141. Given $A=\left[\begin{array}{lll}5 & 0 & 4 \\ 2 & 3 & 2 \\ 1 & 2 & 1\end{array}\right], B^{-1}=\left[\begin{array}{lll}1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4\end{array}\right]$. Compute $(A B)^{-1}$.

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142. Find the area bounded by the curves $x^{2}+y^{2}=25,4 y=\left|4-x^{2}\right|$, and $x=0$ above the x -axis.

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