

MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

APPLICATIONS OF INTEGRALS - FOR COMPETITION

Solved Examples

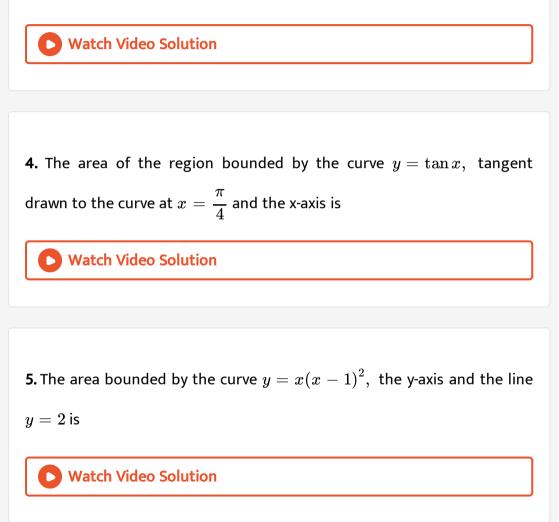
1. Find the area of the region bounded by the x-axis and the curves defined by $y = \tan x, \ -\frac{\pi}{3} \le x \le \frac{\pi}{3}$ and $y = \cot x, \frac{\pi}{6} \le x \le \frac{3\pi}{2}$

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

x = y

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



6. 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

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

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8. The line y = mx bisects the area enclosed by the curve $y = 1 + 4x - x^2$ and the lines $x = 0, x = \frac{3}{2}andy = 0$. Then the value of m is $\frac{13}{6}$ b. $\frac{6}{13}$ c. $\frac{3}{2}$ d. 4

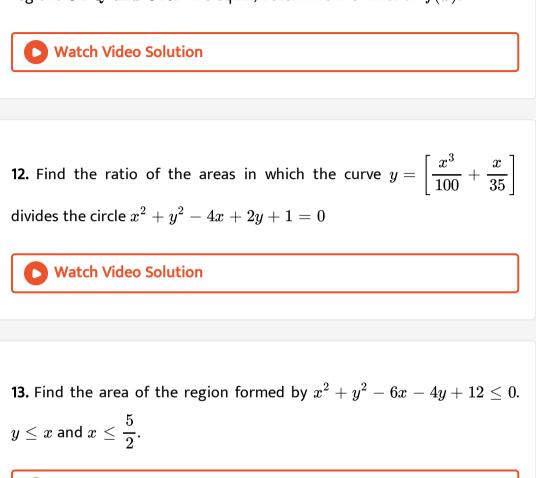
9. Let $f(x) = Ma\xi\mu m\Big\{x^2, (1-x)^2, 2x(1-x)\Big\}$, where $0 \le x \le 1$. Determine the area of the region bounded by the curves $y = f(x), x - a\xi s, x = 0$, and x = 1.

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10. A curve y = f(x) passes through the origin. Through any point (x, y) on the curve, lines are drawn parallel to the co-ordinate axes. If the curve divides the area formed by these lines and co-ordinates axes in the ratio m:n, find the curve.

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11. Let C_1 and C_2 , be the graph of the functions $y = x^2$ and $y = 2x, 0 \le x \le 1$ respectively. Let C_3 , be the graph of a function $y - (fx), 0 \le x \le 1, f(0) = 0$. For a point Pand C_2 , let the lines through P, parallel to the axes, meet C_2 and C_3 , at Q and R respectively. 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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14. 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.

15. Find the area of the region lying inside $x^2 + \left(y-1
ight)^2 = 1$ and outside

$$c^2x^2+y^2=c^2$$
, where $c=\sqrt{2}-1.$

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16. Consider a square with vertices at (1, 1), (-1, 1), (-1, -1), and (1, -1). Set 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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17. Let A_n be the area bounded by the curve $y=(\tan x)^n$ and the lines $x=0,y=0,\,$ and $x=rac{\pi}{4}.$ Prove that for $n>2,\,A_n+A_{n-2}=rac{1}{n-1}$ and deduce `1/(2n+2)

18. Let f(x) be continuous function given by $f(x) = \{2x, |x| \le 1x^2 + ax + b, |x| > 1\}$. 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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19. The area of the region included between the curves $x^2+y^2=a^2$ and $\sqrt{|x|}+\sqrt{|y|}=\sqrt{a}(a>0)$ is

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20. The area of the region bounded by the parabola $(y-2)^2 = x - 1$,

the tangent to the parabola at the point (2,3) and the x-axis is



21. Find the area of the region given by $x+y \leq 6, x^2+y^2 \leq 6y$ and

$$y^2 \leq 8x.$$

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22. Let $b \neq 0$ and for j = 0, 1, 2, ..., n. Let S_j be the area of the region bounded by Y_axis and the curve $x \cdot e^{ay} = \sin by$, $\frac{j\pi}{b} \leq y \leq \frac{(j+1)\pi}{b}$. Show that $S_0, S_1, S_2, ...S_n$ are in geometric progression. Also, find their sum for a=-1 and $b = \pi$.

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

24. 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 valueoccurs 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 right angle at V. Find the area enclosed by f(x) and chord AB.

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25. Find the area of the region bounded by the curves $y=x^2, y=ig|2-x^2ig|, and yl=2,$ which lies to the right of the line x=1.

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26. The area bounded by the parabola $y = (x + 1)^2$ and $y = (x - 1)^2$ and the line $y = \frac{1}{4}$ is (A) 4 sq. units (B) $\frac{1}{6}$ sq. units (C) $\frac{3}{4}$ sq. units (D) $\frac{1}{3}$ sq. units 27. The area of the region bounded by the curves $y = \sqrt{\frac{1 + \sin x}{\cos x}}$ and $y = \sqrt{\frac{1 - \sin x}{\cos x}}$ bounded by the lines x=0 and $x = \frac{\pi}{4}$ is Watch Video Solution

28. Consider the function
$$f(x)=egin{cases} x-[x]-rac{1}{2} & x
otin \\ 0 & x\in I \end{bmatrix}$$
 where [.]

denotes the fractional integral function and I is the set of integers. Then

 $ext{find } g(x) ext{ max } . ig[x^2, f(x), |x| ig], \ -2 \leq x \leq 2.$

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29. Consider the function $f(x) = \begin{cases} x - [x] - \frac{1}{2} & x \notin \\ 0 & x \in I \end{cases}$ where [.] denotes the fractional integral function and I is the set of integers. Then find $g(x) \max . [x^2, f(x), |x|\}, -2 \le x \le 2.$

1. Show that the area between the curve $y = ce^{2x}$, the x-axis and any two ordinates is proportional to the difference between the ordinates, cbeing constant.

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2. Find the area bounded by the curve y = (x+1)(x-1)(x+2) and

the x-axis.

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

4. Find the area included between the parabola $y = rac{x^2}{4a}$ and the curve

$$y=rac{8a^3}{x^2+4a^2}.$$

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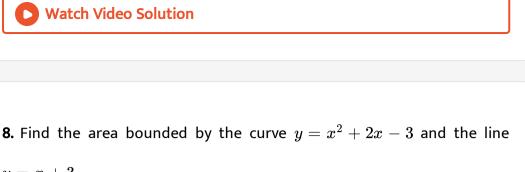
5. Prove that the curves $y^2 = 4x$ and $x^2 = 4y$ divide the area of the square bounded by x=0,x=4, y=4 and y=0 into three equal parts

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6. 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 = 2andx = 4. If the ordinate at x = a divides the area into two equal parts, then find a.

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7. Find the area included between the curves $y=x^2$ and $y=x^3$.



y = x + 3.

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9. The smaller area included between $y=\sqrt{4-x^2}, y=x\sqrt{3}$ and the x-

axis is

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10. For any real $t, x = rac{1}{2} (e^t + e^{-t}), y = rac{1}{2} (e^t - e^{-t})$ 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 $t_1and - t_1$ $\mathsf{is}t_1$

11. Find the area included between the curve $y=\sqrt{8-x^2}$, the tangent

to it at the point with abscissa x = -2 and the x-axis.



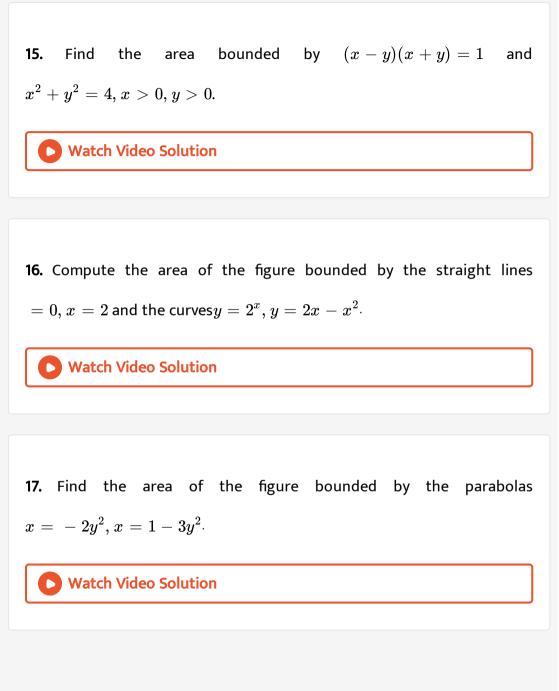
12. Find the area of the figure bounded by the curve $y = \sin^{-1} x$, the lines x = 0 and $y = \frac{\pi}{2}$.

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13. The area common to the circle $x^2+y^2=64$ and the parabola $y^2=12x$ is equal to

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14. The area included between $x^2 + y^2 = 2ax ext{ and } y^2 = ax$ is



18. Compute the area of the region in the first quadrant bounded by the

curves
$$y^2=4x$$
 and $\left(x-4
ight)^2+y^2=16$



19. The area of the loop between the curve $y = a \sin x$ and x-axis is (A) a

(B) 2a (C) 3a (D) none of these

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20. Find the area of the figure bounded by parabola $y = -x^2 - 2x + 3$,

the tangent to it at the point (2-5) and the y-axis.



21. Find the area of the region lying in the first quadrant and included

between the curves

$$x^2+y^2=3a^2.\,x^2=2ay$$
 and $y^2=2ax.\,a>0$

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22. The slope of the tangent to a curve y = f(x) at (x, f(x)) is 2x + 1.

If the curve passes through the point (1, 2) then the area of the region bounded by the curve, the x-axis and the line x = 1 is (A) $\frac{5}{6}$ (B) $\frac{6}{5}$ (C) $\frac{1}{6}$ (D) 1

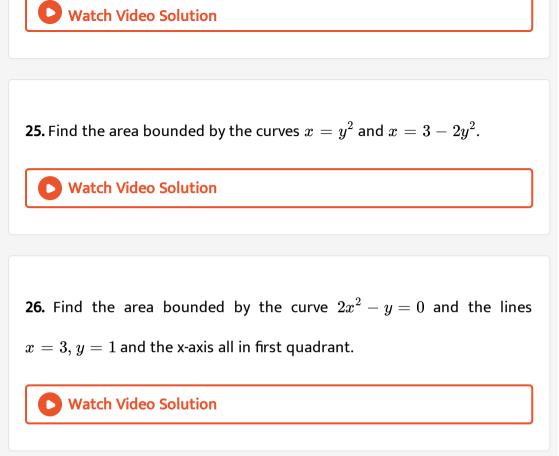


23. Find the area of the region enclosed by the curves $y = x \log x$ and $y = 2x - 2x^2$.

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24. The area enclosed by the circle $x^2 + \left(y+2
ight)^2 = 16$ is divided into two

parts by the x-axis. Find by integration, the area of the smaller part.



27. Sketch the region bounded by the curve, $y=rac{1}{2}ig(2-3x-2x^2ig)$,

below the line y = x + 1, and above the x-axis, also find its area.



28. Using integration find the area of the region bounded by the curves

 $y=\sqrt{4-x^2},$ $x^2+y^2-4x=0$ and the x-axis.

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29. The area bounded by the curve y=f(x), the x-axis and x=1 and x=c is $(c-1){
m sin}(3c+4)$ Then f(x) is

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30. Find the area bounded by the curve $20y = 7 - 10x^2 + 20x^3 - 10x^4$, the axis of x and the two ordinates, corresponding to the points of maxima of this function.



31. Find the area lying in the first quadrant, bounded by the curves $y^2 - x + 2 = 0$ and y = |x - 2|.



32. Find the area of the region bounded by the curves $2y^2 = x, 3y^2 = x+1, y=0.$

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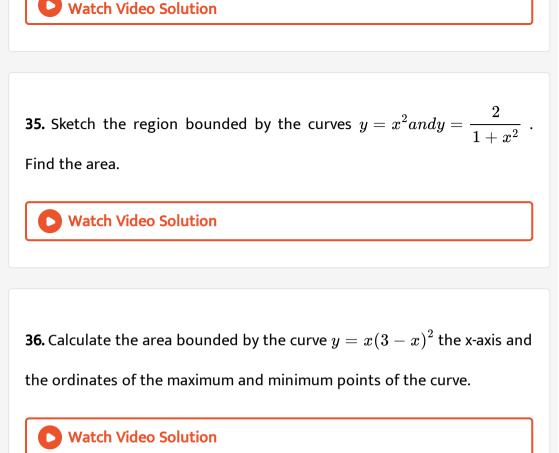
33. Find the ratio of the two areas bounded by the curve $y = x^2 \sin 2x$ (x

being in radians) and the x-axis from x = 0 from x = 0 to $x = \pi$.

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34. Find the area of the region which is inside the parabola satisfying the

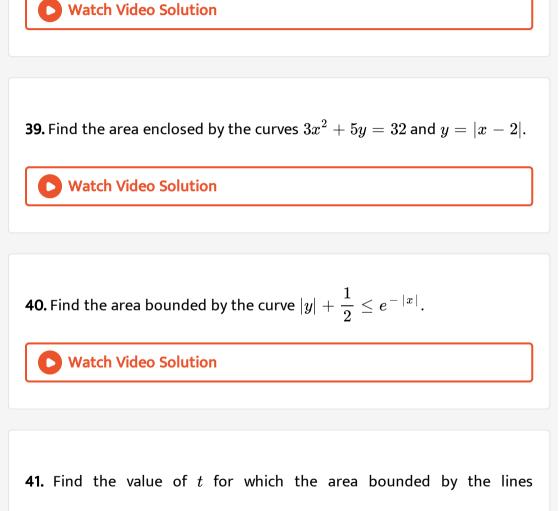
condition $|x-2y|+|x+2y| \leq 8$ and $xy \geq 2$.



37. In what ratio does the x-axis divide the area of the region bounded by

the parabolas $y=4x-x^2 and y=x^2-x$?

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



y=0, x=0, x=1 and the curve $y=t^2x^2+tx+1$ is minimum.

42. Find the area bounded by the curves $y = \log x$ and $y = (\log x)^2$.



43. Area bounded by the curves
$$y=x$$
 and $y=x^3$ is (A) $rac{1}{2}$ (B) 1 (C) $rac{3}{2}$ (D)



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44. Area bounded by the curves $|y|=1-x^2$ is (A) $rac{4}{3}$ (B) $rac{8}{3}$ (C) $rac{16}{3}$ (D)

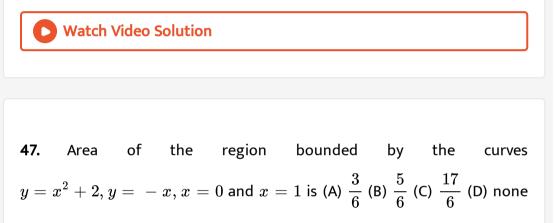
none of these

45. Area of the region bounded by the curves

$$y = 2^x, y = 2x - x^2, x = 0$$
 and $x = 2$ is given by (A) $3\log 2 - \frac{4}{3}$ (B)
 $\frac{3}{\log 2} - \frac{4}{3}$ (C) $3\log 2 + \frac{4}{3}$ (D) $\frac{3}{\log 2} + \frac{4}{3}$

46. Area bounded by the curves y=|x-1|, y=0 and |x|=2 is (A) 4

(B) 8 (C) 5 (D) 9



of these

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

AB of the ellipse.

49. The area bounded by the curve $y = x^4 - 2x^3 + x^2 + 3$, the x-axis and the two ordinates corresponding to the points of minimum of this function is (A) $\frac{11}{15}$ (B) $\frac{91}{30}$ (C) $\frac{91}{60}$ (D) none of these

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

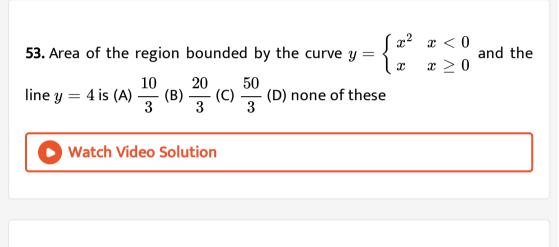
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51. If the area of the region bounded by $y = \sin ax$, y = 0, $x = \frac{\pi}{a}$ and $x = \frac{\pi}{3a}$ is 4, then the positive value of a is (A) $\frac{1}{2}$ (B) 2 (C) $\frac{5}{8}$ (D) none of these

these

52. The area of the region bounded by the curve $y = \tan x$, tangent drawn to the curve at $x = \frac{\pi}{4}$ and the x-axis is

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54. The area inside the parabola $5x^2-y=0$ but outside the parabola

 $2x^2-y+9=0$ is $12\sqrt{3}squal squal squares (d) <math>3x^2-y+9=0$ is $12\sqrt{3}squal squares$ (d)

 $4\sqrt{3}squarts$

55. Area of the region bounded by the line x-y+2=0 and the curve $x=\sqrt{y}$ is (A) 9 (B) $rac{16}{3}$ (C) $rac{5}{3}$ (D) 4

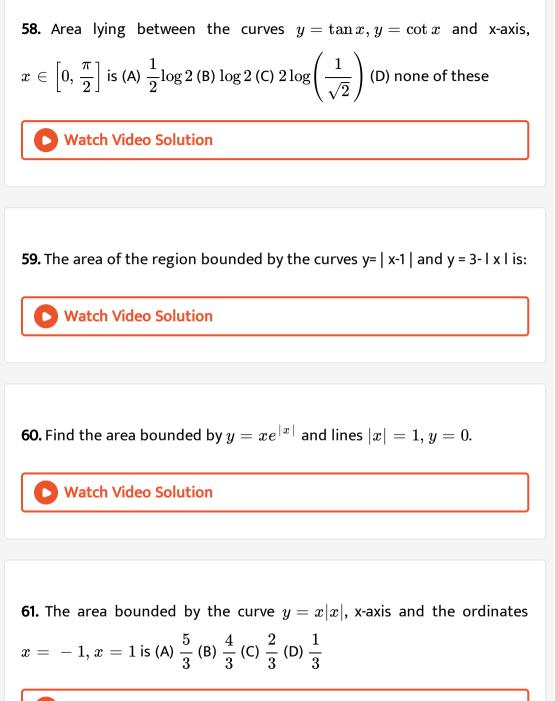
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56. The area cut off from a parabola by any double ordinate is k time the corresponding rectangle contained by the double ordinate and its distance from the vertex. Find the value of k ?

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57. Area common to the curves $y=x^3$ and $y=\sqrt{x}$ is (A) $rac{5}{12}$ (B) $rac{5}{4}$ (C) $rac{5}{2}$

(D) none of these



62. The area
$$\{(x,y); x^2 \le y \le \sqrt{x}\}$$
 is equal to $rac{1}{3}$ b. $rac{2}{3}$ c. $rac{1}{6}$ d. none of

these



63. The area enclosed by the curve $y = x^5$, the x-axis and the ordinates x = -1, x = 1 is (A) 0 (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) none of these

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64. The area bounded by the curves y = f(x), the x-axis, and the ordinates x = 1 and x = b is $(b-1)\sin(3b+4)$. Then f(x) is. $(x-1)\cos(3x+4) \quad \sin(3x+4) \quad \sin(3x+4) + 3(x-1)\cos(3x+4)$ None of these

65. The area bounded by the curve $y = x^2$, the x-axis and the line $x = 2^{\frac{1}{3}}$ is divided into two equal areas by the line x = k. The value of k is (A) $2^{-\frac{2}{3}}$ (B) $2^{-\frac{1}{3}}$ (C) 1 (D) $2^{\frac{1}{3}} - 1$



66. The area bounded by the curve $y^2 = 9x$ and the lines x = 1, x = 4 and y = 0, in the first quadrant, is

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67. The area of the region bounded by the curve $y=x-x^2$ between

$$x=0$$
 and $x=1$ is (A) $rac{1}{6}$ (B) $rac{1}{3}$ (C) $rac{1}{2}$ (D) $rac{5}{6}$

68. The area of the loop between the curve $y = a \sin x$ and x-axis is (A) a

(B) 2a (C) 3a (D) none of these



69. Area of the region bounded by the curve $y^2 = 4x$, y-axis and the line y = 3 is (A) 2 sq. units (B) $\frac{9}{4}$ sq. units (C) $6\sqrt{3}$ sq. units (D) none of these

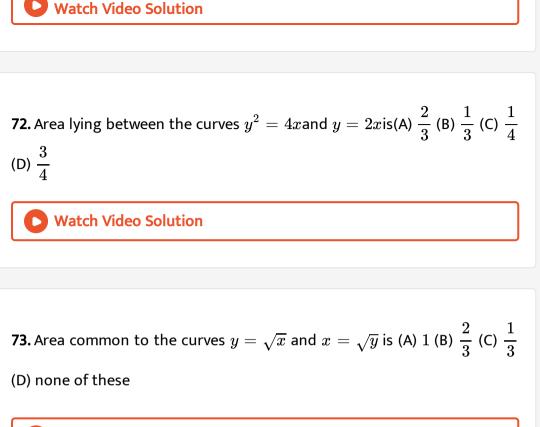
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70. Area between the curve $y = 4 + 3x - x^2$ and x-axis in sq. units is (A) $\frac{125}{3}$ (B) $\frac{125}{4}$ (C) $\frac{125}{6}$ (D) none of these

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71. Area lying in the first quadrant and bounded by the circle $x^2 + y^2 = 4$ and the lines x = 0 and x = 2 is(A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

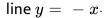




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74. Area bounded by the curve $xy^2 = a^2(a - x)$ and the y-axis is $\frac{\pi a^2}{2}squares and squares and <math>\pi a^2squares and \pi a^2squares and squares an$

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





76. Find the area between the curve $y = x \sin x$ and x-axis from x = 0 to

 $x = 2\pi$.

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77. The area bounded by the x-axis and the curve $y=4x-x^2-3$ is

78. Area of the ellipse
$$rac{x^2}{a^2}+rac{y^2}{b^2}=1$$
is πab

79. The area of the region bounded by y = |x - 1| and y = 1 is

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80. The slope of the tangent to a curve y = f(x) at (x, f(x)) is 2x + 1.

If the curve passes through the point (1, 2) then the area of the region bounded by the curve, the x-axis and the line x = 1 is (A) $\frac{5}{6}$ (B) $\frac{6}{5}$ (C) $\frac{1}{6}$ (D) 1

. ,

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81. The area bounded by the parabola $y^2 = x$, straight line y = 4 and y-

axis is

82. The area enclosed between the curve $y^2 = 4x$ and the line y = x is

(A)
$$\frac{8}{3}$$
 (B) $\frac{4}{3}$ (C) $\frac{2}{3}$ (D) $\frac{1}{2}$

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83. Area bounded by the lines y=2+x, y=2-x and x=2 is (A) 3

(B) 4 (C) 8 (D) 16

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84. Area bounded by the parabola $y^2 = x$ and the line 2y = x is (A) $\frac{4}{3}$ (B) 1 (C) $\frac{2}{3}$ (D) $\frac{1}{3}$

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85. Area of the curve $x^2+y^2=2ax$ is (A) πa^2 (B) $2\pi a^2$ (C) $4\pi a^2$ (D) $rac{\pi a^2}{2}$

86. Area enclosed by the parabola $y^2 = 8x$ and the line y = 2x is (A) $\frac{4}{3}$ (B) $\frac{3}{4}$ (C) $\frac{1}{4}$ (D) $\frac{1}{2}$

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

line x + y = 3.

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88. The area of the region bounded by the lines $x = 0, x = \frac{\pi}{2}$ and $f(x) = \sin x, g(x) = \cos x$ is (A) $2(\sqrt{2}+1)$ (B) $\sqrt{3}-1$ (C) $2(\sqrt{3}-1)$ (D) $2(\sqrt{2}-1)$

89. The ratio of the areas between the curves $y = \cos x$ and $y = \cos 2x$ and x-axis from x = 0 to $x = \frac{\pi}{3}$ is (A) 1:3 (B) 2:1 (C) $\sqrt{3}$:1 (D) none of these

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90. Area between the x-axis and the curve $y = \cos x$, when $0 \le x \le 2\pi$ is

(A) 0 (B) 2 (C) 3 (D) 4

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91. The area common to the parabolas $y = 2x^2$ and $y = x^2 + 4$ (in square units) is (A) $\frac{2}{3}$ (B) $\frac{3}{2}$ (C) $\frac{32}{3}$ (D) $\frac{3}{32}$

92. The area bounded by the curve $y = \log_e x$, the x-axis and the line x = e is (A) e sq. units (B) 1 sq. unit (C) $\left(1 - \frac{1}{e}\right)$ sq. units (D) $\left(1 + \frac{1}{e}\right)$ sq. units

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93. The area bounded by the curve $y = x^3$, x-axis and two ordinates x = 1 and x = 2 is equal to (A) $\frac{15}{2}$ sq. units (B) $\frac{15}{4}$ sq. units (C) $\frac{17}{2}$ sq. units (D) $\frac{17}{4}$ sq. units

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94. The area bounded by the curve $y = 4x - x^2$ and x-axis is (A) $\frac{30}{7}$ sq. units (B) $\frac{31}{7}$ sq. units (C) $\frac{32}{3}$ sq. units (D) $\frac{34}{3}$ sq. units

95. The area of the region bounded by the curve $y = 2x - x^2$ and the

line y = x is

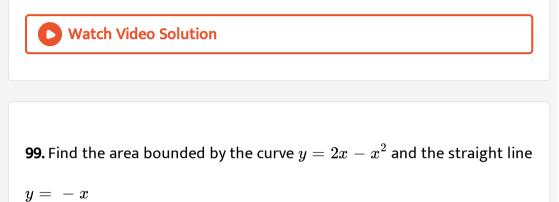
96. The area bounded by the x-axis, the curve y = f(x), and the lines x = 1, x = b is equal to $\sqrt{b^2 + 1} - \sqrt{2}$ for all b > 1, then f(x) is $\sqrt{x - 1}$ (b) $\sqrt{x + 1} \sqrt{x^2 + 1}$ (d) $\frac{x}{\sqrt{1 + x^2}}$

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97. The area formed by triangular shaped region bounded by the curves

 $y=\sin x, y=\cos x$ and x=0 is (A) $\sqrt{2}-1$ (B) 1 (C) $\sqrt{2}$ (D) $1+\sqrt{2}$

98. The triangle formed by the tangent to the curve $f(x) = x^2 + bx - b$ at the point (1, 1) and the coordinate axes, lies in the first quadrant. If its area is 2, then the value of b is (a) -1 (b) 3 (c) -3 (d) 1

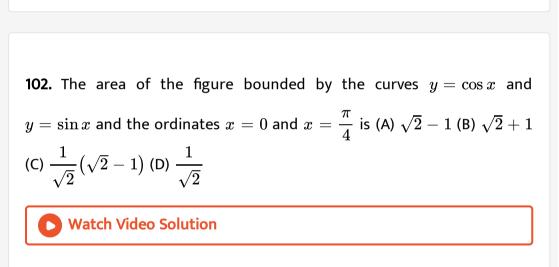


100. The area between
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$
 and the straight line $\frac{x}{a} + \frac{y}{b} = 1$
is
(A) $\frac{1}{2}\pi ab$
(B) $\frac{1}{2}ab$
(C) $\frac{\pi ab}{4} - \frac{ab}{2}$
(D) $\frac{1}{4}ab$

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101. 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



103. The area bounded by the curves y=lnx, y=ln|x|, y=|lnx| and y=|ln||x| is

104. The area bounded by the curve $y = \sec x$, the x-axis and the lines x = 0 and $x = \frac{\pi}{4}$ is (A) $\log(\sqrt{2} + 1)$ (B) $\log(\sqrt{2} - 1)$ (C) $\frac{1}{2}\log 2$ (D) $\sqrt{2}$

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105. The area of the region bounded by the curves y = |x - 1| and y = 3 - |x| is (A) 6 sq. units (B) 2 sq. units (C) 3 sq. units (D) 4 sq. units

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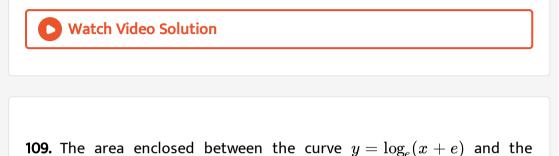
106. The area bounded by the curves y=lnx, y=ln|x|, y=|lnx| and y=|ln||x| is



107. The area of the region bounded by the curves y = |x - 1| and

 $y=3-\left|x
ight|$ is (A) 6 sq. units (B) 2 sq. units (C) 3 sq. units (D) 4 sq. units

108. The area of the region bounded by the curves y=|x-2|, x=1, x=3 and $thex-a\xi sis(A)$ 3(B)2(C)1(D)4`



coordinate axes is

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110. The parabola $x^2 = 4y$ and $y^2 = 4x$ divide the square region bounded by the lines x = 4, y = 4 and the coordinate axes. If S_1 , S_2 , S_3 are respectively the areas of these parts numbered from top to bottom, then $S_1: S_2: S_3$ is (A) 2: 1: 2 (B) 1: 2: 1 (C) 1: 2: 3 (D) 1: 1: 1

111. 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 $x = \frac{\pi}{4} andx = \beta > \frac{\pi}{4} is\beta \sin\beta + \frac{\pi}{4} \cos\beta + \sqrt{2}\beta$. 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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112. The area enclosed between the curves $y^2=xandy=|x|$ is (1) 2/3 (2)

1 (3) 1/6 (4) 1/3

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113. The area of the plane region bounded by the curves $x+2y^2=0$ and

$$x+3y^2=1$$
 is equal to (1) ${5\over 3}$ (2) ${1\over 3}$ (3) ${2\over 3}$ (4) ${4\over 3}$

114. The area bounded by the curves $y = \sqrt{x}$, 2y + 3 = x, and x-axis in the 1st quadrant is 18 sq. units (b) $\frac{27}{4}$ s qu n i t s $\frac{4}{3}$ s qu n i t s (d) 9 sq. units

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115. The area enclosed between the curves $y = ax^2$ and $x = ay^2(a > 0)$ is 1 sq. unit, value of a is $\frac{1}{\sqrt{3}}$ (b) $\frac{1}{2}$ (c) 1 (d) $\frac{1}{3}$

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116. The area bounded by $y = \left| e^{\left| x \right|} - e^{-x} \right|$, the x-axis and x = 1 is (A)

$$\int_{0}^{1}ig(e^{x}-e^{-x}ig)dx$$
 (B) $e+e^{-1}-2$ (C) $e+e^{-1}+2$ (D) $\left(\sqrt{e}-rac{1}{\sqrt{e}}
ight)^{2}$

117. The function f is such that : f(xy) = f(x) + f(y), x, y > 0 and f'(1) = 2 and A the area bounded by the curves y = f(x), x = 2 and the x-axis, then (A) $f(x) = 2\log_e x$ (B) $f(x) = 2\log_e x$ (C) $A = 2(2\log_e 2 - 1)$ (D) $A = 4\log\left(\frac{2}{\sqrt{e}}\right)$

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118. 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 $rac{9}{2}$? -4 (b) -2 (c) 2 (d) 4

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119. Area bounded by the curves $y^2 = 4x$ and y = 2x is equal to (A)

$$\int_0^1 ig(2\sqrt{x}-2xig) dx$$
 (B) $rac{1}{3}$ (C) $rac{2}{3}$ (D) $\int_0^2 igg(rac{y}{2}-rac{y^2}{4}ig) dy$.

120. The area of the region bounded by the curve
$$y=e^x$$
 and lines $x=0 and y=e$ is $e-1$ (b) $\int_1^e 1n(e+1-y)dy \ e-\int_0^1 e^x dx$ (d) $\int_1^e 1nydy$

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121. Statement-1: The area bounded by the curve $y = x \sin x$, x-axis and ordinates x = 0 and $x = 2\pi$ is 4π .Statement-2: The area bounded by the curve y = f(x), x-axis and two ordinates x = a and x = b is $\int_{a}^{b} |y| dx$. (A) Both 1 and 2 are true and 2 is the correct explanation of 1 (B) Both 1 and 2 are true and 2 is not correct explanation of 1 (C) 1 is true but 2 is false (D) 1 is false but 2 is true



122. Statement-1: The area bounded by the curve $y = 2x^2$ and $y = x^2 + 4$ is $\frac{32}{3}$ sq. units.Statement-2: The area bounded by the curves x = f(y), x = g(y) and two abscissae y = c and y = d is $\int_{c}^{d} |f(y) - g(y)| dy$. (A) Both 1 and 2 are true and 2 is the correct explanation of 1 (B) Both 1 and 2 are true and 2 is not correct explanation of 1 (C) 1 is true but 2 is false (D) 1 is false but 2 is true

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123. Statement-1: The area bounded by the curves $y = x^2$ and $y = \frac{2}{1+x^2}$ is $2\pi - \frac{2}{3}$ Statement-2: The area bounded by the curves y = f(x), y = g(x) and two ordinates x = a and x = b is $\int_a^b [f(x) - g(x)] dx$, if f(x) > g(x). (A) Both 1 and 2 are true and 2 is the correct explanation of 1 (B) Both 1 and 2 are true and 2 is not correct explanation of 1 (C) 1 is true but 2 is false (D) 1 is false but 2 is true

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124. Let the area bounded by the curve y = f(x), x-axis and the ordinates

x=1 and x=a be $(a-1){
m sin}(3a+4)$.Statement-1:

$$f(x) = \sin(3x + 4) + 3(x - 1)\cos(3x + 4)$$
.Statement-2: If

$$y = \int_{g(x)}^{h(x)} f(t)dt$$
, then $\frac{dy}{dx} = f(h(x))h'(x) - f(g(x))g'(x)$. (A) Both
1 and 2 are true and 2 is the correct explanation of 1 (B) Both 1 and 2 are
true and 2 is not correct explanation of 1 (C) 1 is true but 2 is false (D) 1 is
false but 2 is true

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125. Statement-1: The area of the region $R = \{(x, y) : |x| \le |y| \text{ and } x^2 + y^2 \le 1\}$ is $\frac{\pi}{4}$ sq. units.Statement-2: Curves |y| = |x| and $x^2 + y^2 = 1$ symmetric about both x and y-axis. (A) Both 1 and 2 are true and 2 is the correct explanation of 1 (B) Both 1 and 2 are true and 2 is not correct explanation of 1 (C) 1 is true but 2 is false (D) 1 is false but 2 is true

126. Statement-1: The area bounded by the curves $y = \ln|x|$, y-axis and y = 1 - |x| is 2 sq. units.Statement-2: Both the curves $y = \log|x|$ and y = 1 - |x| are symmetric about y-axis. (A) Both 1 and 2 are true and 2 is the correct explanation of 1 (B) Both 1 and 2 are true and 2 is not correct explanation of 1 (C) 1 is true but 2 is false (D) 1 is false but 2 is true

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127. Consider the polynomial $f(x) = 1 + 2x + 3x^2 + 4x^3$. Let s be the sum of all distinct real roots of f(x) and let t = |s|.

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128. Consider the polynomial $f(x) = 1 + 2x + 3x^2 + 4x^3$. Let s be the sum of all distinct real roots of f(x) and let t = |s|.

129. Consider the polynomial $f(x) = 1 + 2x + 3x^2 + 4x^3$. Let s be the

sum of all distinct real roots of f(x) and let t = |s|.

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130. A normal to the curves $x^2 + kx - y + 2 = 0$ at the point P whose abscissa is 1 is parallel to the line, y = x. Now answer the question.The value of k is equal to (A) -3 (B) 1 (C) 0 (D) 2

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131. A normal to the curves $x^2 + kx - y + 2 = 0$ at the point P whose abscissa is 1 is parallel to the line, y = x. Now answer the question. The value of k is equal to (A) -3 (B) 1 (C) 0 (D) 2

132. A normal to the curves $x^2 + kx - y + 2 = 0$ at the point P whose abscissa is 1 is parallel to the line, y = x. Now answer the question. The value of k is equal to (A) -3 (B) 1 (C) 0 (D) 2

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133. Let
$$f(x) = \begin{cases} rac{x^3+2x^2-x-2}{x^3-2x^2-x+2} & f ext{ or } |x| < 1 \ x^2+ax+b & f ext{ or } |x| \geq 1 \end{cases}$$
 be continuous for all $x.$

Now answer the question: The values of a and b are given by

$$(A) a = -\frac{8}{3}, b = -\frac{4}{3}$$
$$(B) a = \frac{4}{3}, b = -\frac{8}{3}$$
$$(C) a = -\frac{4}{3}, b = -\frac{8}{3}$$
$$(D) a = -\frac{4}{3}, b = \frac{8}{3}$$

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134. Consider the two curves $C_1: y = 1 + \cos x ext{ and } C_2: y = 1 + \cos(x - \alpha) ext{ for } \alpha \in \left(0, rac{\pi}{2}\right), ext{ where}$

Also the area of the figure bounded by the curves C_1, C_2 , and x = 0 is same as that of the figure bounded by $C_2, y = 1$, and $x = \pi$. The value of α is



135. Consider the two curves $C_1: y = 1 + \cos x$ and $C_2: y = 1 + \cos(x - \alpha)$ for $\alpha \in \left(0, \frac{\pi}{2}\right)$, where Also the area of the figure bounded by the curves C_1, C_2 , and x = 0 is same as that of the figure bounded by $C_2, y = 1$, and $x = \pi$. The value of α is

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136. Consider the two curves $C_1: y = 1 + \cos x$ and $C_2: y = 1 + \cos(x - \alpha)$ for $\alpha \in \left(0, \frac{\pi}{2}\right)$, where Also the area of the figure bounded by the curves C_1, C_2 , and x = 0 is same as that of the figure bounded by $C_2, y = 1$, and $x = \pi$. The value of α is 137. The area of bounded by $e^{\ln{(x+1)}} \geq |y|, |x| \leq 1$ is....

138. Let
$$f(x) = \min \left[\tan x, \cot x, \frac{1}{\sqrt{3}} \right], x \in \left[0, \frac{\pi}{2} \right]$$
. If the area bounded by $y = f(x)$ and x-axis is $\ln\left(\frac{a}{b}\right) + \frac{\pi}{6\sqrt{3}}$, where a, b are

coprimes. Then *ab*=.....

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139. If Δ be the area between the curve $y=x^2+x-2$ and line y=2x for which $\left|x^2+x-2\right|+\left|2x\right|=\left|x^2+3x-2\right|$ is satisfied, then 9Δ is equal to.....

140. If Δ be the area in square units of the region bounded by the parabola $y=-x^2-2x+3$, the line tangent to it at the point P(2, -5) and the y-axis, then 3Δ is equal to...

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141. If the area bounded by the curve $y = \cos^{-1}(\cos x)$ and $y = |x - \pi|$ is $\frac{\pi^2}{n}$, then n is equal to...

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142. Let
$$f(x) = \min \left[\tan x, \cot x, \frac{1}{\sqrt{3}} \right], x \in \left[0, \frac{\pi}{2} \right]$$
. If the area bounded by $y = f(x)$ and x-axis is $\ln\left(\frac{a}{b}\right) + \frac{\pi}{6\sqrt{3}}$, where a, b are coprimes. Then ab =....