JEE MAIN + ADVANCED

MATHEMATICS

TOPIC NAME

AREA UNDER THE CURVE

(PRACTICE SHEET)

LEVEL- 1

Question based on **Area bounded by a curve**

Q.1 The area between the curves $y = 6 - x - x^2$ and x-axis is -
(A) 125/6 (B) 125/2
(C) 25/6 (D) 25/2

Q.2 The area between the curve $y = e^x$ and x-axis which lies between $x = -1$ and $x = 1$ is-
(A) $e^2 - 1$ (B) $(e^2 - 1)/e$
(C) $(1 - e)/e$ (D) $(e - 1)/e^2$

Q.3 The area bounded by the curve $y = \sin 2x$, x- axis and the ordinate $x = \pi/4$ is-
(A) $\pi/4$ (B) $\pi/2$ (C) 1 (D) 1/2

Q.4 The area between the curve $xy = a^2$, x-axis, $x = a$ and $x = 2a$ is-
(A) a log 2 (B) a^2 log 2
(C) 2a log 2 (D) none of these

Q.5 Area under the curve $y = \sin 2x + \cos 2x$ between $x = 0$ and $x = \frac{\pi}{4}$, is-
(A) 2 sq. units (B) 1 sq. units
(C) 3 sq. units (D) 4 sq. units

Q.6 The area bounded by the curve $y = 4x^2$; $x = 0$, $y = 1$ and $y = 4$ in the first quadrant is-
(A) $2\frac{2}{3}$ (B) $3\frac{1}{3}$ (C) $2\frac{1}{3}$ (D) $3\frac{1}{2}$

Q.7 The area between the curve $y = \sec x$ and y-axis when $1 \le y \le 2$ is-
(A) $\frac{2\pi}{3} - \log(2 + \sqrt{3})$
(B) $\frac{2\pi}{3} + \log(2 + \sqrt{3})$
(C) $\frac{\pi}{3} - \frac{1}{2}\log(2 + \sqrt{3})$
(D) None of these

Q.8 The area bounded by the lines $y = x$, $y = 0$ and $x = 2$ is-
(A) 1 (B) 2
(C) 4 (D) None of these

Q.9 The area bounded by the curve $y = 1 + 8/x^2$, x-axis, $x = 2$ and $x = 4$ is-
(A) 2 (B) 3 (C) 4 (D) 5

Q.10 The area between the curve $y = \log x$ and x-axis which lies between $x = a$ and $x = b$ $(a > 1, b > 1)$ is-
(A) b log (b/e) – a log (a/e)
(B) b log (b/e) + a log (a/e)
(C) log ab
(D) log (b/a)

Q.11 Area bounded by the curve $y = xe^{x^2}$, x- axis and the ordinates $x = 0$, $x = \alpha$ is-
(A) $\frac{e^{\alpha^2} + 1}{2}$ sq. units (B) $\frac{e^{\alpha^2} - 1}{2}$ sq.units
(C) $e^{\alpha^2} + 1$ sq. units (D) $e^{\alpha^2} - 1$ sq.units

Q.12 The area bounded between the curve $y = 2x^2 + 5$, x-axis and ordinates $x = -2$ and $x = 1$ is-
(A) 21 (B) 29/5 (C) 23 (D) 24

Q.13 Area bounded by curve $xy = c$, x-axis between $x = 1$ and $x = 4$, is-
(A) c log 3 sq. units
(B) 2 log c sq. units
(C) 2c log 2 sq. units
(D) 2c log 5 sq. units

Q.14 The area bounded by the curve $y = x \sin x^2$, x-axis and $x = 0$ and $x = \sqrt{\frac{\pi}{2}}$ is-
(A) 1/2 (B) $1/\sqrt{2}$ (C) 1/4 (D) $\pi/2$

Q.15 The area bounded between the curve $\frac{x}{4} - \frac{y}{2} + 1 = 0$, $x = -2$, $x = 3$ and x-axis is-
(A) 45/4 (B) 45/2 (C) 15 (D) 25/2

Q.16 The area bounded by curves $y = \tan x$, x-axis and $x = \frac{\pi}{3}$ is-
(A) 2 log 2 (B) log 2
(C) $\log\left(\frac{2}{\sqrt{3}}\right)$ (D) 0

Q.17 The area between the curve $x^2 = 4ay$, x-axis, and ordinate $x = d$ is-
(A) $d^3/12a$ (B) d^3/a
(C) $d^3/2a$ (D) $d^3/6a$

Q.18 Area bounded by the curve $y = x(x-1)^2$ $0 \le x \le 1$ and x-axis is-
(A) 4 (B) 1/3
(C) 1/12 (D) 1/2

Q.19 The area bounded by the curve $y = \log_e x$, x-axis and ordinate x = e is-
(A) $\log_e 2$ (B) 1/2 unit
(C) 1 unit (D) e unit

Q.20 The area bounded by the curve $y = \frac{1}{\cos^2 x}$, coordinates axes and $x = \pi/4$ is-
(A) 1 (B) 2
(C) $\pi/4$ (D) ∞

Q.21 The area between the curve $y^2 = 4x$, y-axis, and y = – 1 and y = 3 is-
(A) 7/3 (B) 9/4 (C) 1/12 (D) 1/4

Q.22 The area bounded by the curve y = sin 2x, y-axis and the abscissa y = 1 is-
(A) 1 (B) 1/4
(C) $\pi/4$ (D) $(\pi/4) - (1/2)$

Q.23 The area between the curve $x = 2y - y^2$ and y-axis is-
(A) 9/4 (B) 4/3
(C) 9 (D) None of these

Q.24 The area bounded by the curve $x^2 = 8y$, x-axis and the ordinate x = –2, x = 4 is-
(A) 4 (B) 2 (C) 1 (D) 3

Q.25 The area bounded by the curve $y^2 = x$, straight line y = 4, and y-axis is-
(A) 16/3 (B) 64/3
(C) $7\sqrt{2}$ (D) None of these

Q.26 The area between the curve $y = \sin^3 x$, x-axis, and the ordinates x = 0 to $x = \pi/2$ is-
(A) 1 (B) 1/3 (C) 2/3 (D) 3/2

Q.27 The value of a for which the area of the region bounded by the curve y = sin 2x, the straight lines $x = \pi/6$, x = a and x-axis is equal to 1/2 is-
(A) $\pi/2$ (B) $\pi/3$ (C) 4/3 (D) $\pi/6$

Q.28 The area of a loop bounded by the curve y = a sin x and x-axis is-
(A) a (B) $2a^2$ (C) 0 (D) 2a

Q.29 The area between the curves $x = 2 - y - y^2$ and y-axis is-
(A) 9 (B) 9/2 (C) 9/4 (D) 3

Q.30 The area bounded by $y = 4x - x^2$ and the x-axis is-
(A) 30/7 (B) 31/7 (C) 32/3 (D) 34/3

Q.31 The area contained between the x-axis and one arc of the curve y = cos 3x is-
(A) 1/3 (B) 2/3 (C) 2/7 (D) 2/5

Question based on **Symmetric area**

Q.32 The area bounded by the curves $y = 4x^2$ and y = 4 is-
(A) 7/3 (B) 14/3 (C) 5/3 (D) 16/3

Q.33 The area bounded between the curve $|y| = 1 - x^2$ is-
(A) 2/3 (B) 4/3
(C) 8/3 (D) None of these

Q.34 The area bounded by the parabola $y^2 = 4ax$, x-axis and x = 2a and latus rectum is-
(A) $2a^2(\sqrt{2} - 1)$ (B) $4a^2(2\sqrt{2} - 1)$
(C) $\frac{4}{3}a^2(2\sqrt{2} - 1)$ (D) $\frac{8a^2}{3}(2\sqrt{2} - 1)$

Q.35 The whole area bounded by the curves x = a cos t, y = b sin t is-
(A) π ab (B) $\left(\frac{\pi}{2}\right)$ab
(C) $\left(\frac{\pi}{4}\right)$ab (D) None of these

Q.36 The whole area of the curve $9x^2+16y^2=144$ is-
(A) 24π (B) 144π
(C) 6π (D) 12π

Question based on **Positive and negative area**

Q.37 The area between the curve y = tan x and x-axis, when $-\pi/4 \le x \le \pi/4$ is-
(A) log 2 (B) log 4
(C) $\log\sqrt{2}$ (D) none of these

Q.38 The area bounded by the curve $y = x^3$, the x-axis and the ordinates x = – 2 and x = 1 is-
(A) – 9 (B) 17/4
(C) – 15/4 (D) 15/4

Q.39 The area between the curve $y = \cos x$ and x- axis when $\pi/2 \le x \le 2\pi$ will be-
(A) 1 (B) 2
(C) 3 (D) 4

Question based on **Area between two curves**

Q.40 The area between the curves $y^2 = 4x$ and $y = 2x$ is-
(A) 1/4 unit (B) 1/3 unit
(C) 1/2 unit (D) 2/3 unit

Q.41 The area bounded by the curves $y = e^x$, $y = e^{-x}$ and the line $x = 1$ is-
(A) $e + e^{-1}$ (B) $e + e^{-1} - 1$
(C) $e - e^{-1} + 1$ (D) $e + e^{-1} - 2$

Q.42 The area bounded by the curve $y = (x - 1)(x - 2)$ and coordinate axes is-
(A) 1/6 (B) 5/6
(C) 1/3 (D) 2/3

Q.43 The area bounded by the lines $y = 2 + x$ and $y = 2 - x$ and x-axis is-
(A) 3 (B) 4
(C) 8 (D) 16

Q.44 The area bounded by the curves $y = \sin x$, $y = \cos x$ and x-axis from $x = 0$ to $x = \pi/2$ is-
(A) $2 + \sqrt{2}$ (B) $\sqrt{2}$
(C) 2 (D) $2 - \sqrt{2}$

Q.45 The area bounded between parabola $x^2 = 4y$ and $y = |x|$ is-
(A) 2/3 (B) 4/3
(C) 8/3 (D) 16/3

Q.46 The area bounded by the curves $y = x^2$ and $y = |x|$ is-
(A) 2/3 (B) 1/6
(C) 1 (D) 1/3

Q.47 The common area of the curves $y = \sqrt{x}$ and $x = \sqrt{y}$ is-
(A) 3 (B) 5/3
(C) 1/3 (D) None of these

Q.48 Area of the region bounded by the curves $y = e^x$, $y = e^{-x}$ and the straight line $y = 2$ is-
(A) log (4/e) (B) 2 log (4/e)
(C) 4 log (4/e) (D) None of these

Q.49 The area bounded by $y = \tan x$, $y = \cot x$, x-axis in $0 \le x \le \frac{\pi}{2}$ is-
(A) log 2 (B) 3 log 2
(C) 2 log 2 (D) 4 log 2

Q.50 The area bounded by the curve $y = 2x - x^2$ and straight line $y = -x$ is-
(A) 35/6 (B) 9/2
(C) 43/6 (D) none of these

Q.51 The area between the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the straight line $\frac{x}{a} + \frac{y}{b} = 1$ is-
(A) $\frac{1}{4}\pi ab - \frac{1}{2}ab$ (B) $\frac{1}{4}ab$
(C) $\frac{1}{2}\pi ab$ (D) none of these

Q.52 The area of the figure bounded by the parabola $y = x^2 + 1$ and the straight line $x + y = 3$ is-
(A) 3/2 (B) 5/2
(C) 7/2 (D) 9/2

Q.53 Common area between the parabolas $y = 2x^2$ and $y = x^2 + 4$ is-
(A) 16/3 (B) 8/3
(C) 32/3 (D) None of these

Q.54 If A is the area between the curve $y = \sin x$ and x-axis in the interval $[0, \pi/2]$, then the area between $y = \sin 2x$ and x-axis in this interval will be-
(A) A (B) 2A
(C) A/2 (D) None of these

Q.55 Find the area enclosed by the lines $y = x/2$, $y = 2x$ and $x = 4$ is-
(A) 1 (B) 2 (C) 12 (D) 16

Q.56 The area of region bounded by $y = |[x - 2]|$, the x-axis and the line $x = -1$ & $x = 2$ is -
(A) 6 sq. unit (B) 8 sq. unit
(C) 4 sq. unit (D) None of these

Q.57 Area bounded by the curve $y = f(x)$, $y = x$ and the lines $x = 1$, $x = t$ is $(t + \sqrt{1+t^2} - \sqrt{2} - 1)$ sq. units for all $t > 1$. If $f(x)$ satisfying $f(x) > x$ for all $x > 1$, then $f(x)$ is equal to -
(A) $x + 1 + \frac{x}{\sqrt{1+x^2}}$ (B) $x + \frac{x}{\sqrt{1+x^2}}$
(C) $1 + \frac{x}{\sqrt{1+x^2}}$ (D) $\frac{x}{\sqrt{1+x^2}}$

LEVEL- 2

Q.1 The area bounded by the curve $y = (x - 1)(x - 2)(x - 3)$, x-axis and ordinates $x = 0$, $x = 3$ is-

(A) 9/4 (B) 11/4

(C) 11/2 (D) None of these

Q.2 Area bounded by the curves $y = 2^x$, $y = 2x - x^2$, $x = 0$ and $x = 2$ is-

(A) $\frac{3}{\log 2} - \frac{4}{3}$ (B) $\frac{3}{\log 2} + \frac{4}{3}$

(C) $3 \log 2 + \frac{4}{3}$ (D) $3 \log 2 - \frac{4}{3}$

Q.3 Area bounded by the curves $y = |x - 1|$, $y = 0$ and $|x| = 2$ is-

(A) 5 (B) 4

(C) 9/2 (D) None of these

Q.4 The area of the region bounded by $y^2 = x$ and $x = 36$ is divided in the ratio 1 : 7 by the line $x = a$, then a equals-

(A) 7 (B) 8 (C) 9 (D) 0

Q.5 The area bounded by the curve $y = 1 - |x|$ and x-axis is-

(A) 1 (B) 1/2 (C) 2 (D) 1/3

Q.6 The area bounded between the curve $x^2 + y^2 = 9$ and lines $y = 3/2$, $y = 3$ and $x = 0$ is-

(A) $\frac{3}{4}(8\pi + 3\sqrt{3})$ (B) $\frac{3}{4}(8\pi - 3\sqrt{3})$

(C) $\frac{3}{2}(4\pi - 3\sqrt{3})$ (D) $\frac{3}{8}(4\pi - 3\sqrt{3})$

Q.7 The area bounded by the curve $y = f(x)$, x-axis and the ordinates $x = 1$ & $x = b$ is $(b - 1)\sin(3b + 4)$, then f(x) equals-

(A) $(x - 1)\cos(3x + 4)$

(B) $\sin(3x + 4)$

(C) $\sin(3x + 4) + 3(x - 1)\cos(3x + 4)$

(D) None of these

Q.8 The area bounded by the parabola $x^2 = 4y$, the x-axis and the line $x = 4$ is divided into two equal area by the line $x = \alpha$, then the value of α is-

(A) $2^{1/3}$ (B) $2^{2/3}$ (C) $2^{4/3}$ (D) $2^{5/3}$

Q.9 The area of the closed figure bounded by $y = \cos x$, $y = 1 + (2/\pi)x$ and $x = \pi/2$ is-

(A) $3\pi/4$ (B) $\pi/2$

(C) $\frac{3\pi - 4}{4}$ (D) $\frac{\pi - 4}{4}$

Q.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) 1 (B) 2 (C) 3 (D) 4

Q.11 Area of the circle $(x - 2)^2 + (y - 3)^2 = 32$ which lies below the line $y = x + 1$ is-

(A) $\int_{-2}^{6} \left[(x+1) + \sqrt{32 - (x-2)^2} + 3\right] dx$

(B) $\int_{-2}^{6} \left[\left\{\sqrt{32 - (x-2)^2} + 3\right\} - (x+1)\right] dx$

(C) 16π

(D) None of these

Q.12 Let $f(x) = \max.\{\sin x, \cos x, 1/2\}$. Then area of the region bounded by $y = f(x)$, x-axis and $x = 0$, $x = 2\pi$, is:

(A) $(5\pi + 12\sqrt{3})/12$ (B) $(5\pi + 12\sqrt{2})/12$

(C) $(5\pi + 36)/12$ (D) None of these

Q.13 The area of the region $\{(x, y) : x^2 \le y \le |x|\}$ is-

(A) 1/3 (B) 1/2 (C) 1/4 (D) None

Q.14 Area bounded by the curve $y^2(2a - x) = x^3$ and the line $x = 2a$ is :

(A) $3\pi a^2$ (B) $3\pi a^2/2$

(C) $3\pi a^2/4$ (D) None of these

Q.15 The area of region bounded by the curve

$y = \begin{cases} 2 - x^2, x \le 1 \\ 2x - 1, x > 1 \end{cases}$, x- axis and the ordinates $x = -1$ and $x = 2$ is

(A) 8/3 (B) 32/3 (C) 4/3 (D) none

LEVEL- 3

Q.1 The area bounded by the curve $y = x|x|$, x axis and the ordinates $x = 1$, $x = -1$ is given by-

(A) 0 (B) $\frac{1}{3}$

(C) $\frac{2}{3}$ (D) none of these.

Q.2 Area lying in the first quadrant and bounded by the circle $x^2 + y^2 = 4$, the line $x = \sqrt{3}\,y$ and x-axis is-

(A) π (B) $\pi/2$

(C) $\pi/3$ (D) none of these.

Q.3 If area bounded by the curve $y^2 = 4ax$ and $y = mx$ is $a^2/3$, then the value of m is-

(A) 2 (B) –2

(C) 1/2 (D) none of these

Q.4 Area bounded by the curve $y = x \sin x$ and x-axis between $x = 0$ and $x = 2\pi$ is

(A) 2 (B) 3π

(C) 4π (D) none of these.

Q.5 The area of the region bounded by $y = |x - 1|$ and $y = 1$ is-

(A) 1 (B) 2

(C) 1/2 (D) none of these.

Q.6 The area of the figure bounded by the curves $y = |x - 1|$ and $y = 3 - |x|$ is-

(A) 2 (B) 3 (C) 4 (D) 1

➢ Statement type Questions

Each of the questions given below consists of Statement-I (Assertion) and Statement-II (Reason). Use the following key to choose the appropriate answer.

(A) If both Statement-I, Statement-II are true, and Statement-II is the correct explanation of Statement-I.

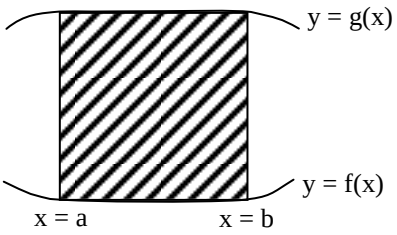
(B) If both Statement-I and Statement-II are true but Statement-II is not the correct explanation of Statement-I

(C) If Statement-I is true but Statement-II is false

(D) If Statement-I is false but Statement-II is true.

Q.7 **Statement-I:** Area common to the curve $y = \sqrt{x}$ and $x = \sqrt{y}$ is 1/3 sq. units

Statement-II: Area = $\int_a^b (g(x) - f(x))\,dx$.



Q.8 **Statement-I:** Let the area bounded by the curve $y = f(x)$, x-axis from $x = 1$ to $x = a$, $a > 1$ be $3a^2 - 4a + 1$ sq. units then $f(x) = 6x - 4$.

Statement-II:

$F(a) = \text{Area} = \int_1^a f(x)\,dx \Rightarrow f(a) = F'(a)$

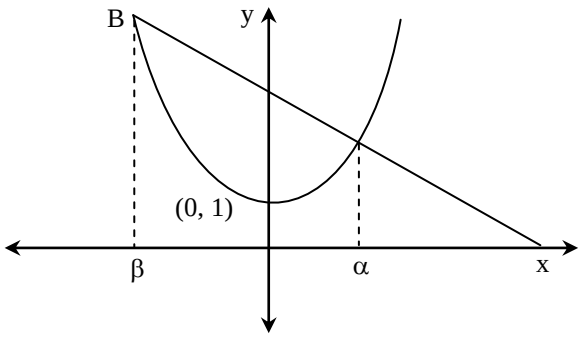
Q.9 **Statement-I:** The area bounded by the curves $y = \sin^{-1} x$, $y = \cos^{-1} x$ and x-axis is $\sqrt{2} - 1$.

Statement-II:

$$\int_0^{1/\sqrt{2}} \sin^{-1} x\,dx + \int_{1/\sqrt{2}}^{1} \left(\frac{\pi}{2} - \sin^{-1} x\right) dx = \sqrt{2} - 1$$

➢ Passage Based Questions

Consider the parabola $y = x^2 + 1$ and the line $x + y = 3$



The line cuts the parabola at A and B. Let the abscissa of A and B be α and β.

Q.10 The values of $\alpha + \beta$ and $\alpha\beta$ must be respectively

(A) 1 and 2 (B) 2 and 1

(C) –1 and –2 (D) None of these.

Q.11 The area bounded between the parabola and the line in terms of α and β must be

(A) $|\alpha - \beta| \left| \frac{(\alpha+\beta)^2 - \alpha\beta}{3} + \frac{\alpha+\beta}{2} - 2 \right|$

(B) $|\alpha - \beta| \left| \frac{\alpha^2+\beta^2}{3} + \frac{\alpha+\beta}{2} - 2 \right|$

(C) $|\alpha - \beta| \, | \, 2 - (\alpha + \beta) - (\alpha^2 + \beta^2) \, |$

(D) None of these.

Q.12 The area bounded between the parabola and the line must be

(A) 2 sq. units

(B) $\frac{35}{6}$ sq. units

(C) 9/2 sq. units

(D) None of these

Q.13 Area of the region bounded by the curve $y = x^2$, $y = |2 - x^2|$ and $y = 2$, which lies to the right of the line $x = 1$, is equal to

(A) $(20 + 12\sqrt{2})/\sqrt{3}$

(B) $(20 + 12\sqrt{2})/3$

(C) $(20 - 12\sqrt{2})/\sqrt{3}$

(D) $(20 - 12\sqrt{2})/3$

Q.14 Area bounded by the curves $x = -4y^2$ and $x = 1 - 5y^2$ is :

(A) 3/4 (B) 4/3 (C) 4 (D) 3

Q.15 Area bounded by the curves $y = x - 1$, y-axis, and $y = [(x^2 + 128)/64]$, $x \in (0, 8)$ above the x-axis, [.] = G.I.F., is equal to

(A) 2 (B) 4 (C) 8 (D) None

Q.16 Let $f(x) = \min \{x + 1, \sqrt{1-x}\}$. Then area bounded by $y = f(x)$ and x- axis is

(A) 11/6 (B) 5/6 (C) 7/6 (D) 1/6

Q.17 Area bounded by the curve $xy^2 = a^2 (a - x)$ and y-axis is $(\because a > 0)$

(A) $\pi a^2/2$ (B) πa^2

(C) $3\pi a^2$ (D) $3\pi a^2/2$

LEVEL- 4

(Question asked in previous AIEEE and IIT-JEE)

SECTION –A

Q.1 If the area bounded by the x-axis, 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- **[AIEEE-2002]**

(A) $\sqrt{(x-1)}$ (B) $\sqrt{(x+1)}$

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

Q.2 The area of the region bounded by the curves y = |x – 1| and y = 3 – |x| is- **[AIEEE-2003]**

(A) 6 sq. units (B) 2 sq. units

(C) 3 sq. units (D) 4 sq. units

Q.3 The area of the region bounded by the curves y = |x – 2|, x = 1, x = 3 and the x- axis is- **[AIEEE-2004]**

(A) 1 (B) 2 (C) 3 (D) 4

Q.4 Area of the greatest rectangle that can be inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is- **[AIEEE-2005]**

(A) 2ab (B) ab

(C) $\sqrt{ab}$ (D) $\frac{a}{b}$

Q.5 The area enclosed between the curve $y = \log_e (x + e)$ and the coordinate axes is- **[AIEEE-2005]**

(A) 1 (B) 2 (C) 3 (D) 4

Q.6 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 respectively the areas of these parts numbered from top to bottom; then $S_1 : S_2 : S_3$ is- **[AIEEE-2005]**

(A) 1 : 2 : 1 (B) 1 : 2 : 3

(C) 2 : 1 : 2 (D) 1 : 1 : 1

Q.7 Let f(x) be a non-negative continuous function such that the area bounded by the curve y = f(x), x-axis and the ordinates $x=\frac{\pi}{4}$ and $x = \beta > \frac{\pi}{4}$ is $\left(\beta\sin\beta+\frac{\pi}{4}\cos\beta+\sqrt{2}\beta\right)$. Then $f\left(\frac{\pi}{2}\right)$ is- **[AIEEE-2005]**

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

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

Q.8 The area enclosed between the curves $y^2 = x$ and y = |x| is **[AIEEE-2007]**

(A) $\frac{2}{3}$ (B) 1

(C) $\frac{1}{6}$ (D) $\frac{1}{3}$

Q.9 The area of the plane region bounded by the curves $x + 2y^2 = 0$ and $x + 3y^2 = 1$ is equal to- **[AIEEE-2008]**

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) $\frac{4}{3}$ (D) $\frac{5}{3}$

Q.10 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 - **[AIEEE-2009]**

(A) 3 (B) 6

(C) 9 (D) 12

Q.11 The area bounded by the curves y = cos x and y = sin x between the ordinates x = 0 and $x=\frac{3\pi}{2}$ is - **[AIEEE-2010]**

(A) $4\sqrt{2}-2$ (B) $4\sqrt{2}+2$

(C) $4\sqrt{2}-1$ (D) $4\sqrt{2}+1$

Q.12 The area of the region enclosed by the curves y = x, x = e, y = 1/x and the positive x-axis is :

[AIEEE-2011]

(A) 1/2 square units (B) 1 square units

(C) 3/2 square units (D) 5/2 square units

Q.13 The area bounded by the curves $y^2 = 4x$ and $x^2 = 4y$ is – **[AIEEE-2011]**

(A) $\frac{32}{3}$ (B) $\frac{16}{3}$

(C) $\frac{8}{3}$ (D) 0

Q.14 The area bounded between the parabolas $x^2 = \frac{y}{4}$ and $x^2 = 9y$, and the straight line $y = 2$ is : **[AIEEE-2012]**

(A) $\frac{10\sqrt{2}}{3}$ (B) $\frac{20\sqrt{2}}{3}$

(C) $10\sqrt{2}$ (D) $20\sqrt{2}$

Q.15 The area (in square units) bounded by the curves $y = \sqrt{x}$, $2y - x + 3 = 0$, x-axis, and lying in the first quadrant is - **[JEE Main - 2013]**

(A) 18 (B) $\frac{27}{4}$ (C) 9 (D) 36

SECTION-B

Q.1 The area of the region bounded by $y = |x - 1|$ and $y = 1$ is **[IIT -1993]**

(A) 1 (B) 2

(C) 1/2 (D) None of these

Q.2 The slope of the tangent to the curve $y = f(x)$ at a point (x, y) is $2x + 1$ and the curve passes through (1, 2). The area of the region bounded by the curve, the x- axis and the line $x = 1$ is- **[IIT- 1995]**

(A) 5/3 units (B) 5/6 units

(C) 6/5 units (D) 6 units

Q.3 The area bounded by the curves $y = |x| - 1$ and $y = -|x| + 1$ is- **[IIT Scr.2002]**

(A) 1 (B) 2

(C) $2\sqrt{2}$ (D) 4

Q.4 Area of the region bounded by $y = \sqrt{x}$, $x = 2y + 3$ & x-axis lying in 1st quadrant is- **[IIT Scr.2003]**

(A) $2\sqrt{3}$ (B) 18

(C) 9 (D) 34/3

Q.5 If area bounded by the curves $x = ay^2$ and $y = ax^2$ is 1, then a equals- **[IIT Scr.2004]**

(A) $\frac{1}{\sqrt{3}}$ (B) $\frac{1}{3}$

(C) $\frac{1}{2}$ (D) 3

Q.6 Find the area between the curves $y = (x - 1)^2$, $y = (x + 1)^2$ and $y = \frac{1}{4}$ **[IIT Scr.2005]**

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) $\frac{4}{3}$ (D) $\frac{1}{6}$

Q.7 Area of the region bounded by the curve $y = e^x$ and lines $x = 0$ and $y = e$ is- **[IIT- 2009]**

(A) $e - 1$ (B) $\int_1^e \ell n(e + 1 - y)\,dy$

(C) $e - \int_0^1 e^x\,dx$ (D) $\int_1^e \ell ny\,dy$

Q.8 Let the straight line $x = b$ divide the area enclosed by $y = (1 - x)^2$, $y = 0$, and $x = 0$ into two parts $R_1(0 \le x \le b)$ and $R_2(b \le x \le 1)$ such that $R_1 - R_2 = \frac{1}{4}$. Then b equals **[IIT- 2011]**

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

Q.9 The area enclosed by the curves $y = \sin x + \cos x$ and $y = |\cos x - \sin x|$ over the interval $\left[0, \frac{\pi}{2}\right]$ is - **[JEE - Advance 2013]**

(A) $4(\sqrt{2} - 1)$ (B) $2\sqrt{2}(\sqrt{2} - 1)$ (C) $2(\sqrt{2} + 1)$ (D) $2\sqrt{2}(\sqrt{2} + 1)$

ANSWER KEY

LEVEL- 1

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	A	B	D	B	B	C	A	B	C	A	B	A	C	A	A	B	A	C	C	A
Q.No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	A	D	B	D	B	C	B	D	B	C	B	D	C	C	A	D	A	B	C	B
Q.No.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57			
Ans.	D	B	B	D	D	D	C	B	A	B	A	D	C	A	C	A	A			

LEVEL- 2

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	A	A	C	A	D	C	D	C	B	C	D	A	A	D

LEVEL- 3

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ans.	C	C	A	C	A	C	A	A	A	C	A	C	D	B	B	C	B

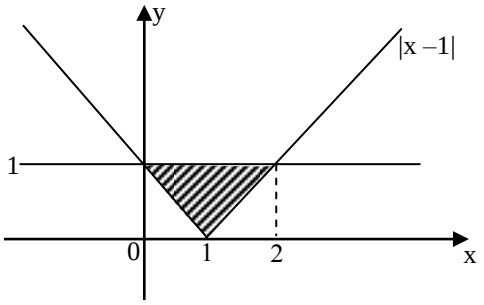
LEVEL- 4

SECTION-A

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	D	D	A	A	A	D	D	C	C	C	A	C	B	B	C

SECTION-B

1.[A]



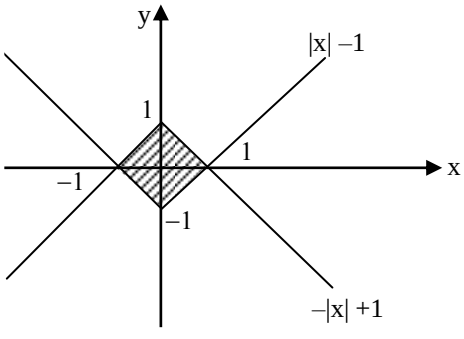
Area = $\frac{1}{2}$. 2. 1 = 1

2.[B] $\frac{dy}{dx} = 2x + 1 \Rightarrow \begin{matrix} y = x^2 + x + c \\ c = 0 \end{matrix}$

It passes through (1, 2)

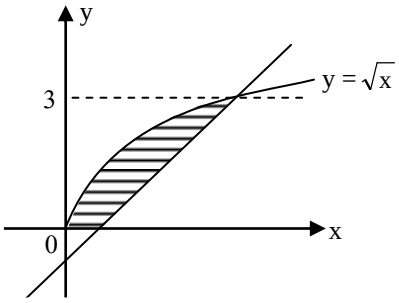
So, Area = $\int_0^1 x^2 + x \, dx = \left(\frac{x^3}{3} + \frac{x^2}{2}\right)_0^1 = \frac{5}{6}$.

3.[B]



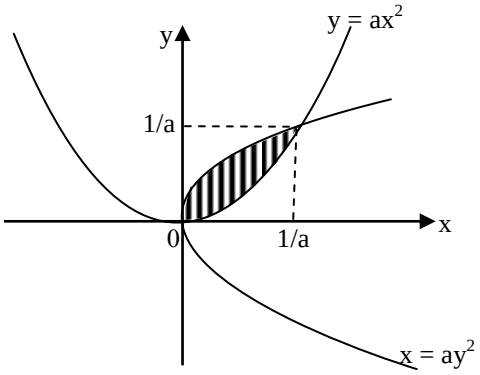
Area of square = $\left(\sqrt{2}\right)^2 = 2$

4.[C]



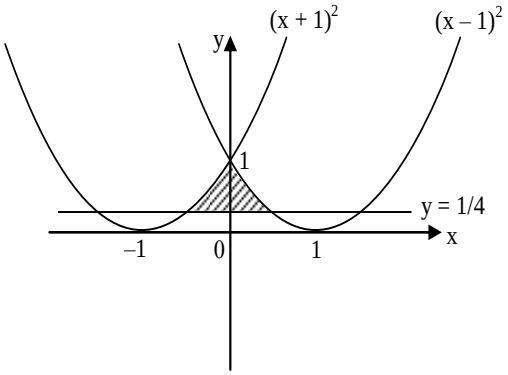
Area = $\int_0^3 (2y+3) - y^2 \, dy = 9$

5.[A]



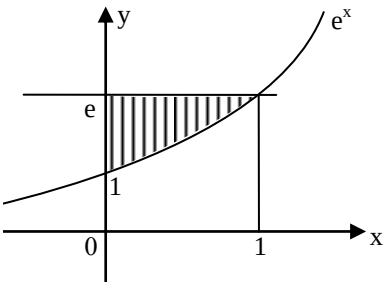
Area = $\int_0^{1/a} \sqrt{\frac{x}{a}} - ax^2 \, dx = 1 \Rightarrow a = \frac{1}{\sqrt{3}}$

6.[A]



Area = $2.\int_{1/4}^{1} (\sqrt{y}+1) = \frac{1}{3}$

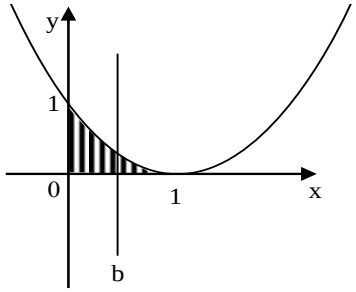
7.[C]



Area = $\int_0^1 1 - e^x dx = \int_1^e \log y \, dy$

$= \int_1^e \log(1+e-y) dy$

8.[B]



$R_1 - R_2 = \frac{1}{4}$

$\int_0^b (x-1)^2 dx - \int_b^1 (x-1)^2 dx = \frac{1}{4}$

$\Rightarrow \left(\frac{(x-1)^3}{3}\right)_0^b - \left(\frac{(x-1)^3}{3}\right)_b^1 = \frac{1}{4}$

$\Rightarrow \frac{(b-1)^3}{3} + \frac{1}{3} + \frac{(b-1)^3}{3} = \frac{1}{4}$

$\Rightarrow \frac{2}{3}(b-1)^3 = \frac{-1}{12} \Rightarrow (b-1)^3 = \frac{-1}{8}$

$\Rightarrow b - 1 = \frac{-1}{2} \Rightarrow b = \frac{1}{2}$

9.[B] Area = $\int_0^{\pi/2} ((\sin x + \cos x) - |\cos x - \sin x|) \, dx$

$= \int_0^{\pi/2} (\sin x + \cos x) \, dx - \int_0^{\pi/4} (\cos x - \sin x) \, dx - \int_{\pi/4}^{\pi/2} (\sin x - \cos x) \, dx$

$= [-\cos x + \sin x]_0^{\pi/2} - [\sin x + \cos x]_0^{\pi/4} - [-\cos x - \sin x]_{\pi/2}^{\pi/4}$

$= (1+1) - (\sqrt{2}-1) - (-1+\sqrt{2})$

$= 2 - \sqrt{2} + 1 + 1 - \sqrt{2}$

$= 4 - 2\sqrt{2}$

$= 2\sqrt{2}\,(\sqrt{2}-1)$