NDA 2 2024

LIVE

MATHS

AREA BOUNDED BY CURVES

NAVJYOTI SIR

Crack
EXAMS

02 July 2024 Live Classes Schedule

8:00AM	02 JULY 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	02 JULY 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

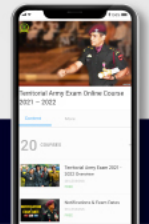
9:00AM	OVERVIEW OF GD & LECTURETTE	ANURADHA MA'AM

NDA 2 2024 LIVE CLASSES

11:30AM	GK - MODERN HISTORY - CLASS 4	RUBY MA'AM
1:00PM	GS - PHYSICS - CLASS 2	NAVJYOTI SIR
2:30PM	GS - CHEMISTRY MCQS - CLASS 7	SHIVANGI MA'AM
4:00PM	MATHS - AREA BOUNDED BY CURVES	NAVJYOTI SIR
5:30PM	ENGLISH - ORDERING OF SENTENCES - CLASS 2	ANURADHA MA'AM

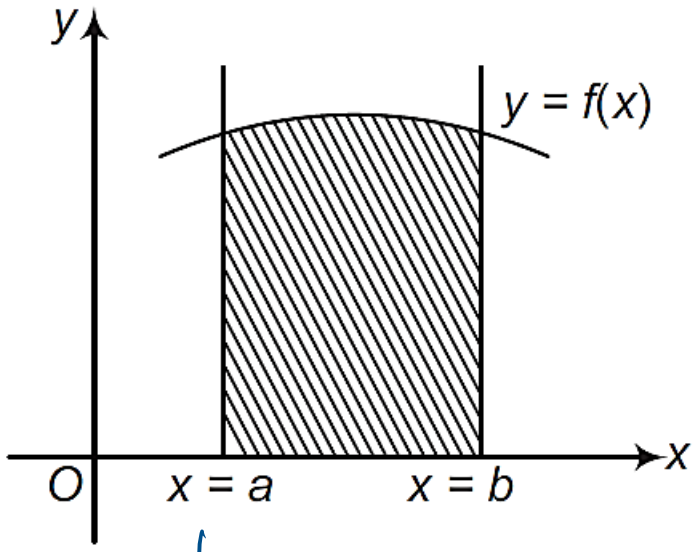
CDS 2 2024 LIVE CLASSES

11:30AM	GK - MODERN HISTORY - CLASS 4	RUBY MA'AM
1:00PM	GS - PHYSICS - CLASS 2	NAVJYOTI SIR
2:30PM	GS - CHEMISTRY MCQS - CLASS 7	SHIVANGI MA'AM
5:30PM	ENGLISH - ORDERING OF SENTENCES - CLASS 2	ANURADHA MA'AM



AREA UNDER CURVE

Area of shaded portion $A = \int_a^b f(x)\,dx$



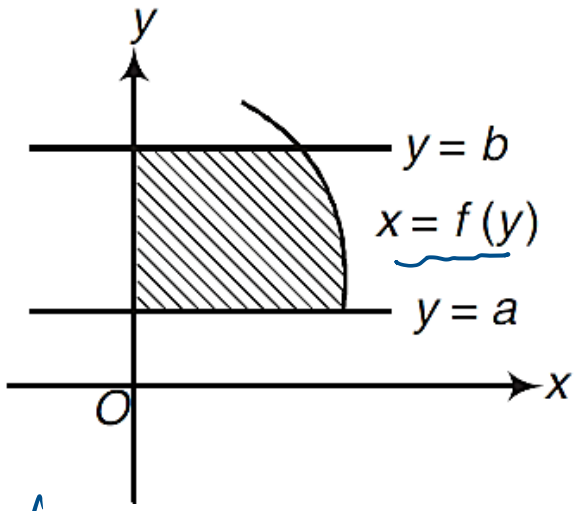
$x = b$

$\int f(x)\,dx$

$x = a$

Area of shaded portion

$A = \int_a^b f(y)\,dy$

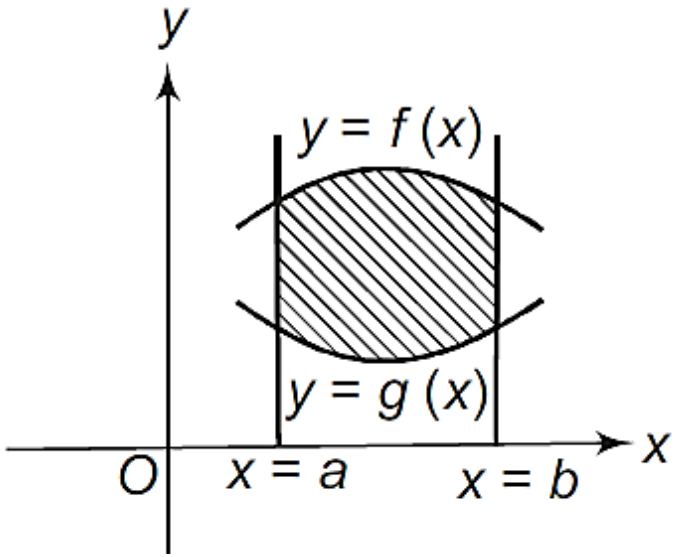


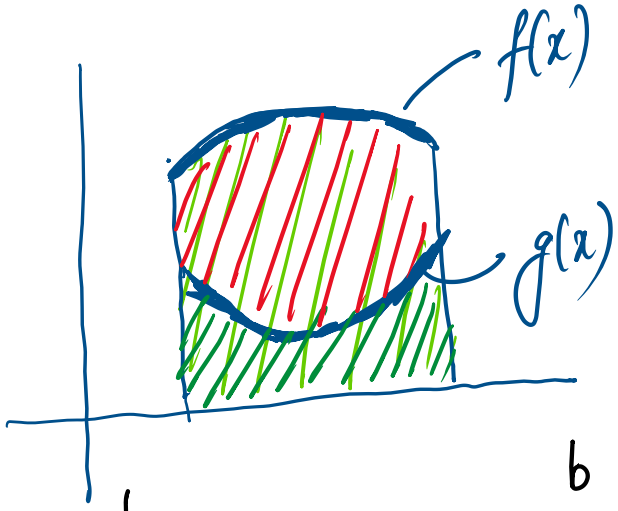
$y = b$

$\int f(y)\,dy$

$y = a$

AREA UNDER CURVE



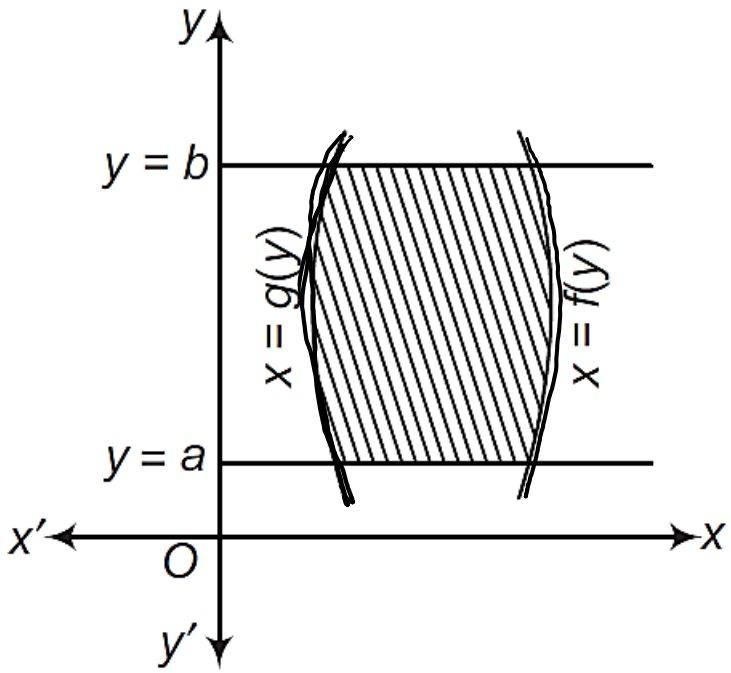


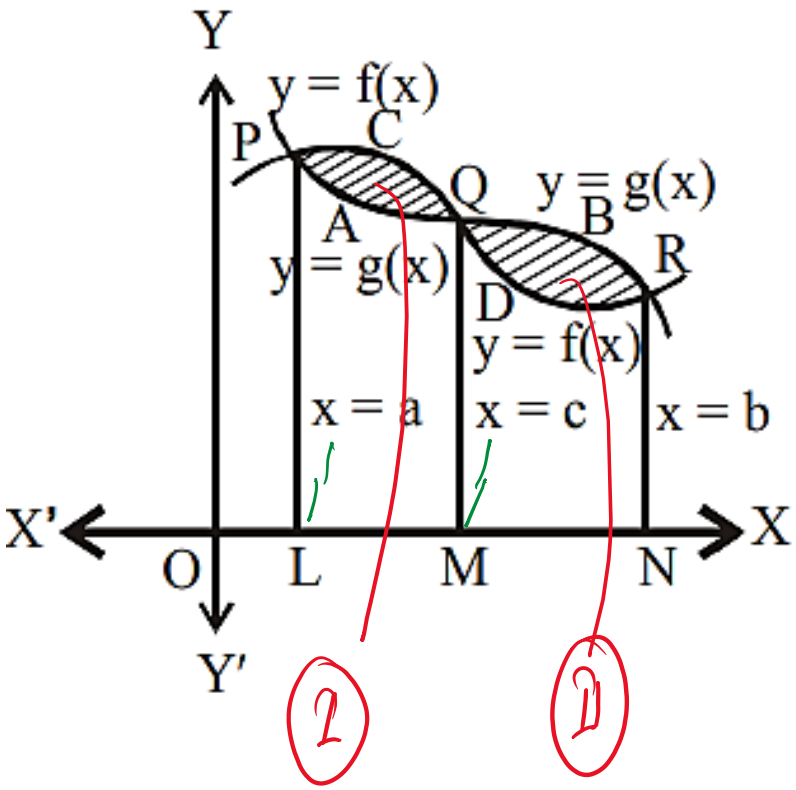
$$\text{Required area} = \int_{x=a}^{b} f(x)\,dx - \int_{x=a}^{b} g(x)\,dx$$

$$= \int_{x=a}^{b} \{f(x) - g(x)\}\,dx$$

AREA UNDER CURVE

$$A = \int_a^b \{f(y) - g(y)\}\, dy$$





Area of Shaded region

$$\int_a^c \{f(x) - g(x)\}dx + \int_c^b \{g(x) - f(x)\}dx$$

I II

EXAMPLE

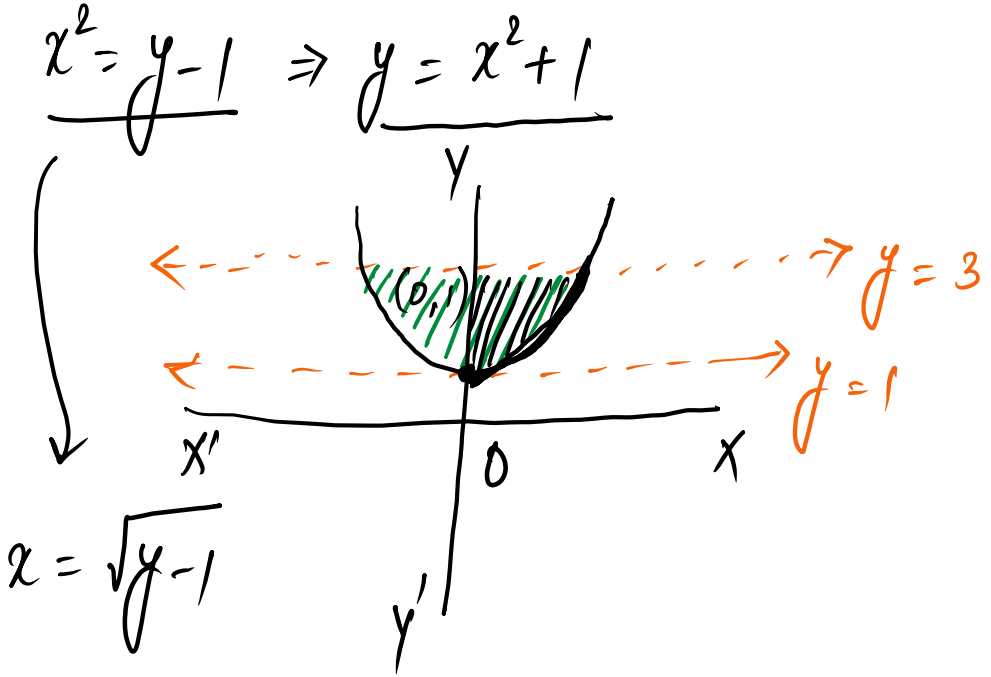
The area of region bounded by the curve. $x^2 = y - 1$ and $y = 3$ is

(a) $\frac{8\sqrt{2}}{3}$ sq units

(b) $\frac{8}{3}$ sq units

(c) 8 sq units

(d) 5 sq units



$$2\int_{y=1}^{y=3} (\sqrt{y-1})\, dy = 2\left[\frac{(y-1)^{3/2}}{3/2}\right]_1^3$$

$$= \frac{4}{3}\left[(2)^{3/2} - 0\right] = \frac{4}{3} \times 2\sqrt{2} = \frac{8\sqrt{2}}{3} \text{ sq. units}$$

EXAMPLE

The area of region bounded by the curve.
$x^2 = y - 1$ and $y = 3$ is

(a) $\frac{8\sqrt{2}}{3}$ sq units

(b) $\frac{8}{3}$ sq units

(c) 8 sq units

(d) 5 sq units

Ans: (a)

EXAMPLE

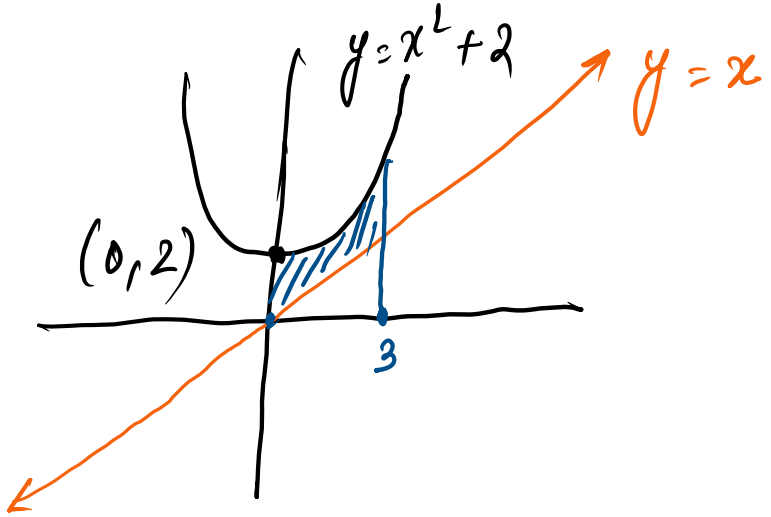
Find the area of the region bounded by the curves $y = x^2 + 2$, $y = x$, $x = 0$ and $x = 3$.

(a) $\frac{15}{2}$ sq units

(b) $\frac{21}{2}$ sq units

(c) $\frac{15}{3}$ sq units

(d) None of these



$$\int_{x=0}^{x=3} (y = f(x))\,dx = \int_{0}^{3} \{(x^2+2) - x\}\,dx$$

$$= \left[\frac{x^3}{3} + 2x - \frac{x^2}{2}\right]_0^3 = 9 + 6 - \frac{9}{2} = 15 - \frac{9}{2} = \frac{21}{2}$$

EXAMPLE

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

(a) $\frac{15}{2}$ sq units

(b) $\frac{21}{2}$ sq units

(c) $\frac{15}{3}$ sq units

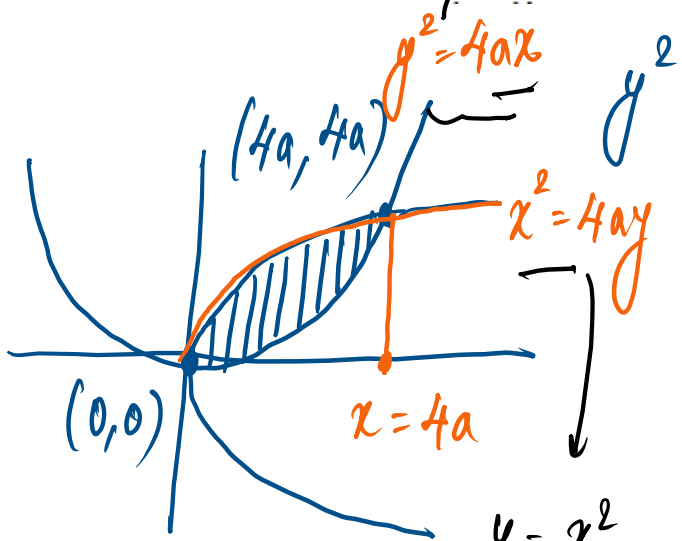
(d) None of these

Ans: (b)

Area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is

(a) $\frac{2}{3}a^2 - 5$ (b) $\frac{15}{4}a^2 + 5$

(c) $\frac{16}{3}a^2 + 2$ (d) $\frac{16}{3}a^2$



$y = \sqrt{4ax}$

$y^2 = 4ax$ $x^2 = 4ay$

$y = \frac{x^2}{4a}$

$\left(\frac{y^2}{4a}\right)^2 = 4ay$

$\frac{y^4}{16a^2} = 4ay$

$y^3 = 64a^3$

$x^2 = 4a(4a)$

$x = 4a$

$y = 4a$

$$\text{Reqd. area} = \int_0^{4a} \left(\left(\frac{x^2}{4a}\right) - \sqrt{4ax} \right) dx$$

$$= \frac{1}{4a}\left(\frac{x^3}{3}\right)_0^{4a} - 2\sqrt{a}\left(\frac{x^{3/2}}{3/2}\right)_0^{4a}$$

$$= \frac{1}{4a}\left(64a^3\right) - \frac{4}{3}\sqrt{a}\left(4a\right)^{3/2}$$

$$= 16a^2 - \frac{4}{3} \times 8 \times (a)^{1/2} a^{3/2}$$

$$= 16a^2 - \frac{32}{3}a^2 = \frac{16}{3}a^2$$

Area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is

(a) $\frac{2}{3}a^2 - 5$

(b) $\frac{15}{4}a^2 + 5$

(c) $\frac{16}{3}a^2 + 2$

(d) $\frac{16}{3}a^2$

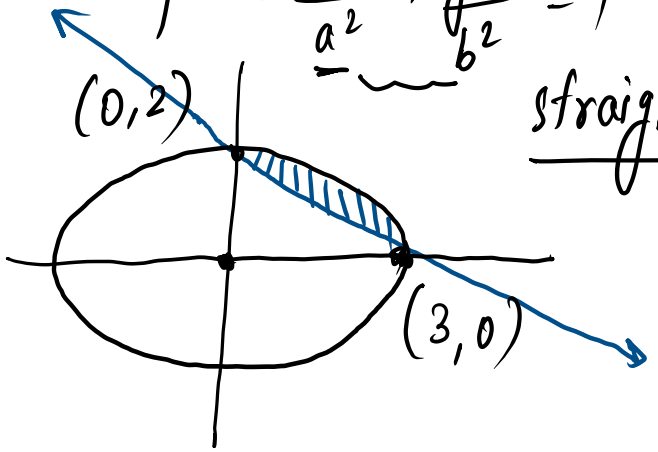
Ans: (d)

The area of the smaller region bounded by the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and the line $\frac{x}{3}+\frac{y}{2}=1$ is

(a) $3(\pi-2)$ (b) $\frac{3}{2}\pi$

(c) $\frac{3}{2}(\pi-2)$ (d) $\frac{2}{3}(\pi-2)$

ellipse : $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ $\frown$ $\frac{y^2}{4}=1-\frac{x^2}{9}$



straight line, $\frac{x}{3}+\frac{y}{2}=1$

intercepts, (3,0), (0,2)

$y^2=\frac{4(9-x^2)}{9}$

$y=\frac{2}{3}\sqrt{9-x^2}$

$2x+3y=6 \Rightarrow y=\frac{6-2x}{3}$

Reqd. area $= \int_{x=0}^{3}\left(\frac{2}{3}\sqrt{9-x^2}\right)-\left(\frac{6-2x}{3}\right)dx$

$= \frac{2}{3}\int_0^3\sqrt{9-x^2}\,dx-\left[2x\right]_0^3+\frac{2}{3}\int_0^3 x\,dx$

$=$

The area of the smaller region bounded by the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and the line $\frac{x}{3}+\frac{y}{2}=1$ is

(a) $3(\pi-2)$

(b) $\frac{3}{2}\pi$

(c) $\frac{3}{2}(\pi-2)$

(d) $\frac{2}{3}(\pi-2)$

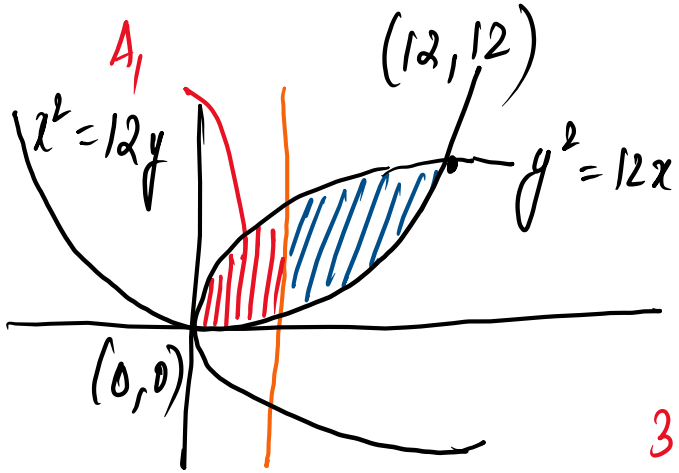
Ans: (c)

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

(a) 15 : 49 (b) 13 : 37

(c) 15 : 23 (d) 17 : 50

points of intersection of $y^2 = 4ax$ & $x^2 = 4ay$ were, $(0,0)$, $(4a, 4a)$



$$A_1 = \int_0^3 \left(\sqrt{12x} - \frac{x^2}{12}\right) dx =$$

$$\frac{A_1}{A_2} = ?$$

$$A_2 = \int_3^{12} \left(\sqrt{12x} - \frac{x^2}{12}\right) dx =$$

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

(a) 15 : 49 (b) 13 : 37

(c) 15 : 23 (d) 17 : 50

Ans: (a)

What is the area of the region enclosed between the curve $y^2 = 2x$ and the straight line $y = x$?

(a) $\frac{1}{2}$ (b) 1 (c) $\frac{2}{3}$ (d) 2

What is the area of the region enclosed between the curve $y^2 = 2x$ and the straight line $y = x$?

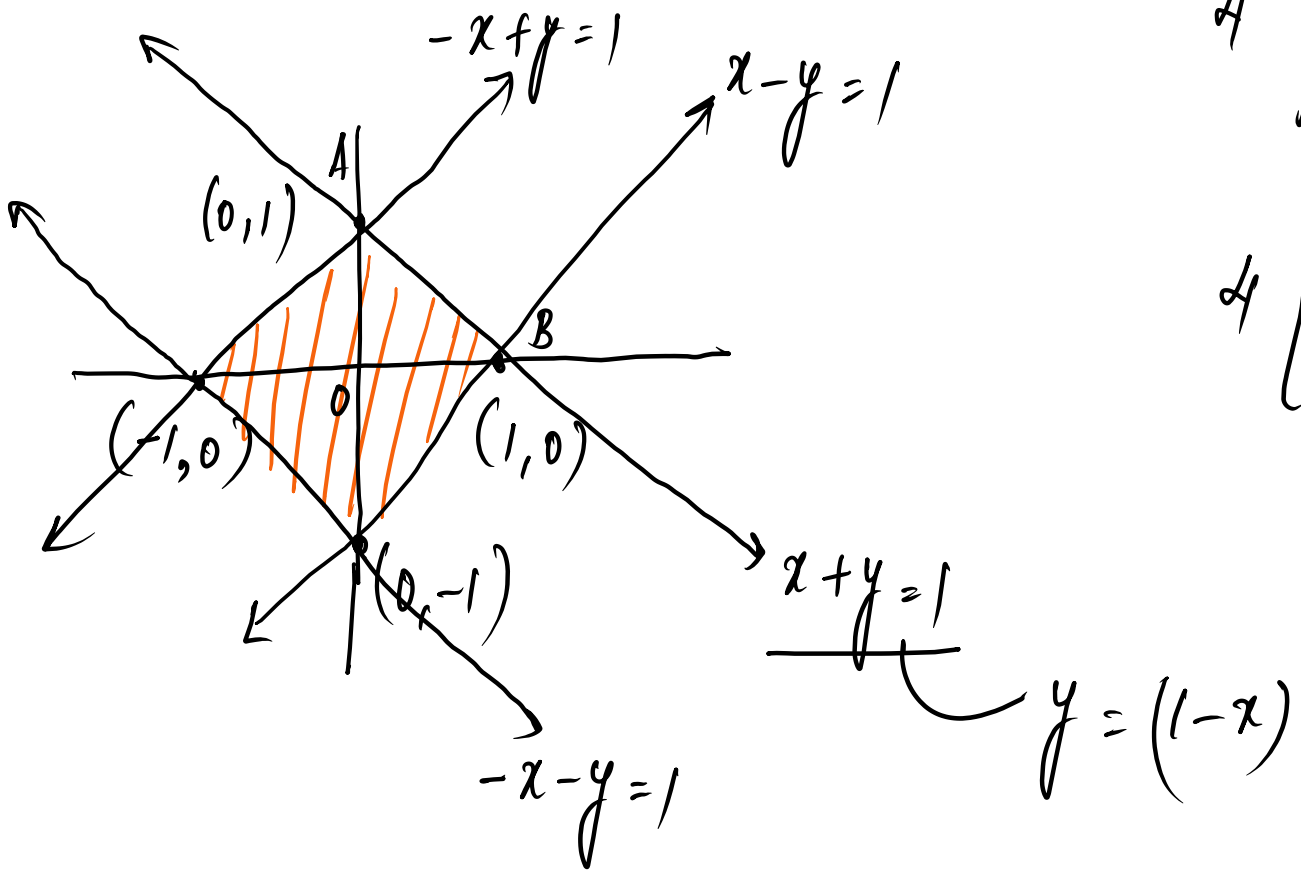
(a) $\frac{1}{2}$ (b) 1 (c) $\frac{2}{3}$ (d) 2

Ans: (c)

The area bounded by the curve $|x| + |y| = 1$ is

(a) 1 square unit (b) $2\sqrt{2}$ square units

(c) 2 square units (d) $2\sqrt{3}$ square units



$$4\int_0^1 (1-x)\,dx \quad (OR)$$

$$4\left[x - \frac{x^2}{2}\right]_0^1 = 4\left(1 - \frac{1}{2}\right) = 4 \times \frac{1}{2}$$

$$4 \times \left(\frac{1}{2} \times 1 \times 1\right)$$

Area of $\triangle OAB$

$= 2$ sq. units.

The area bounded by the curve $|x|+|y|=1$ is

(a) 1 square unit
(b) $2\sqrt{2}$ square units
(c) 2 square units
(d) $2\sqrt{3}$ square units

Ans: (c)

NDA 2 2024

LIVE

MATHS

DIFFERENTIAL EQUATIONS

CLASS 1

NAVJYOTI SIR

Crack
EXAMS