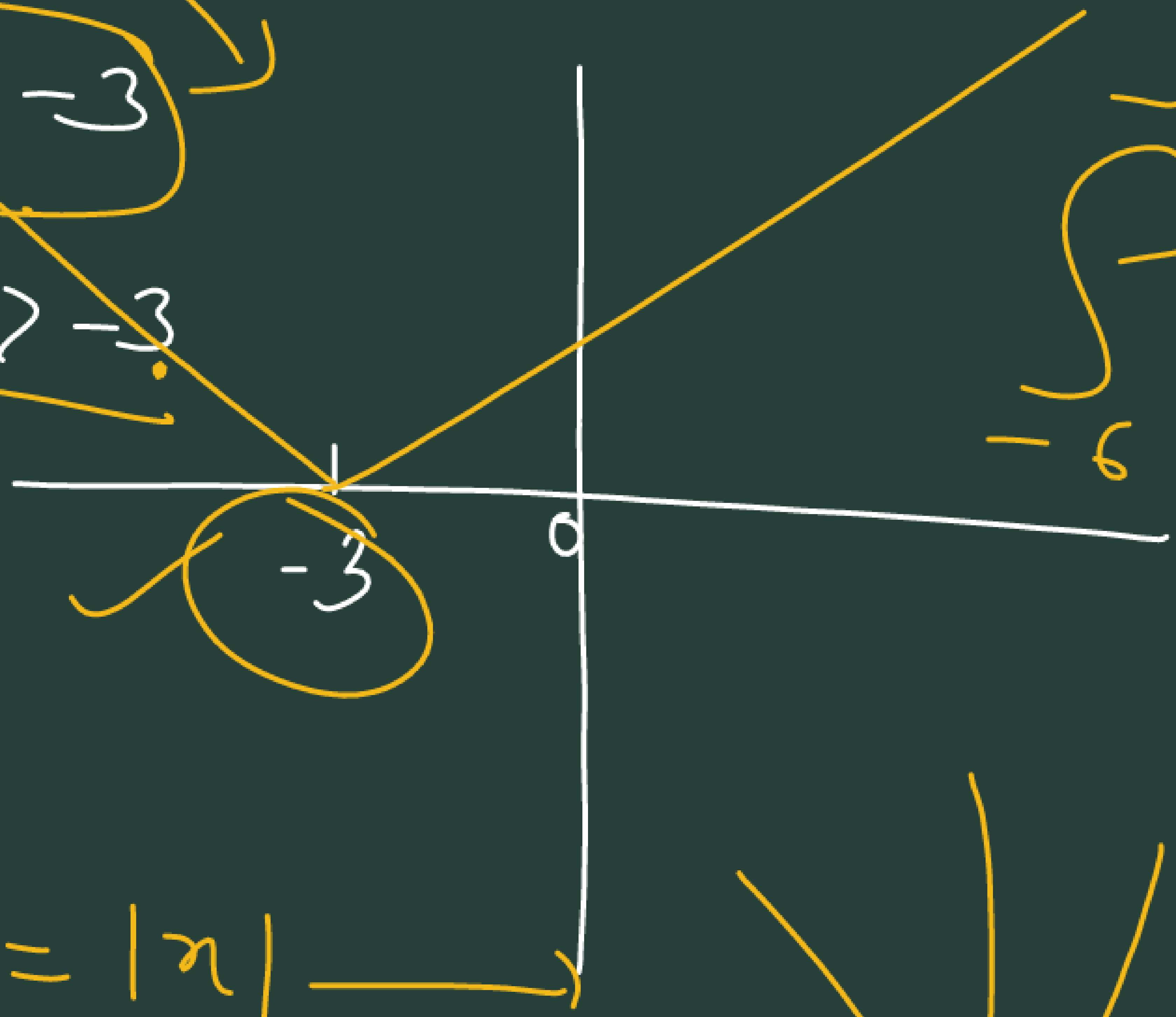
Ques:- sketch graph of $y = |x+3|$ & $\int_{-6}^{0} |x+3| \cdot dx$

$$y = \begin{cases} -(x+3); & x < -3 \\ +(x+3); & x > -3 \end{cases}$$



$x + 3 = 0$

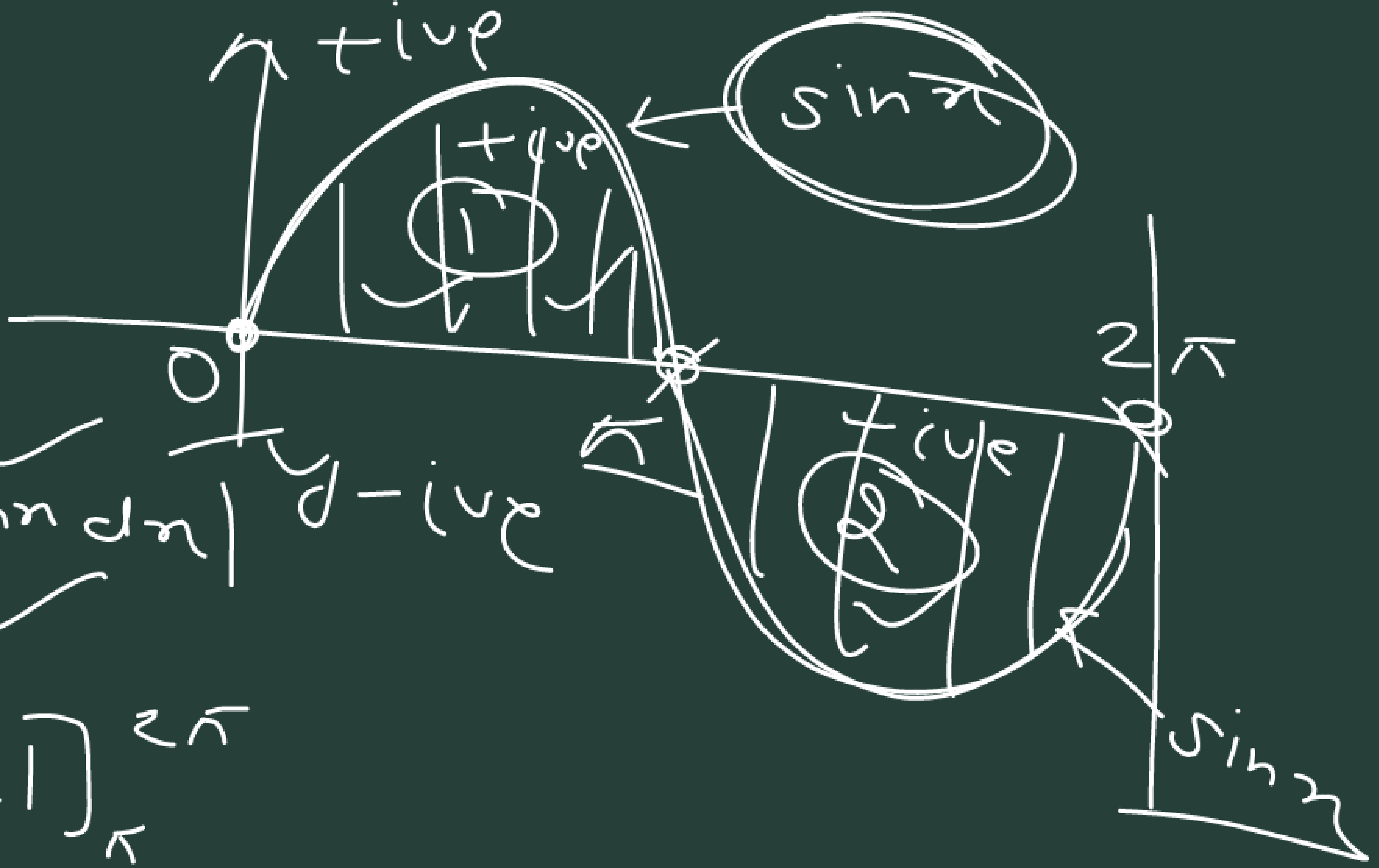
$x = -3$

$$\int_{-6}^{-3} -(x+3)\,dx + \int_{-3}^{0} (x+3) \cdot dx$$

$y = |x|$

Ques1 find area bounded by $y = \sin x$ b/w $x = 0$ & $x = 2\pi$

$\because$ area $= \int_0^{2\pi} \sin x \, dx$



$$\text{Area} = \int_0^{\pi} \sin x \, dx + \int_{\pi}^{2\pi} |\sin x \, dx| \quad y\text{-ive}$$

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

$$\Rightarrow [-\cos\pi + \cos 0] + [|-\cos 2\pi + \cos\pi|]$$

$$= [-(-1)+1] + [|(-1-1)|] = 2+2 = 4 \text{ Ans}$$

Q. $y^2 = 4ax$ & line $y = mx = \cancel{m}\frac{4a}{\cancel{m^2}}$

intersection :- $m^2x^2 = 4ax$

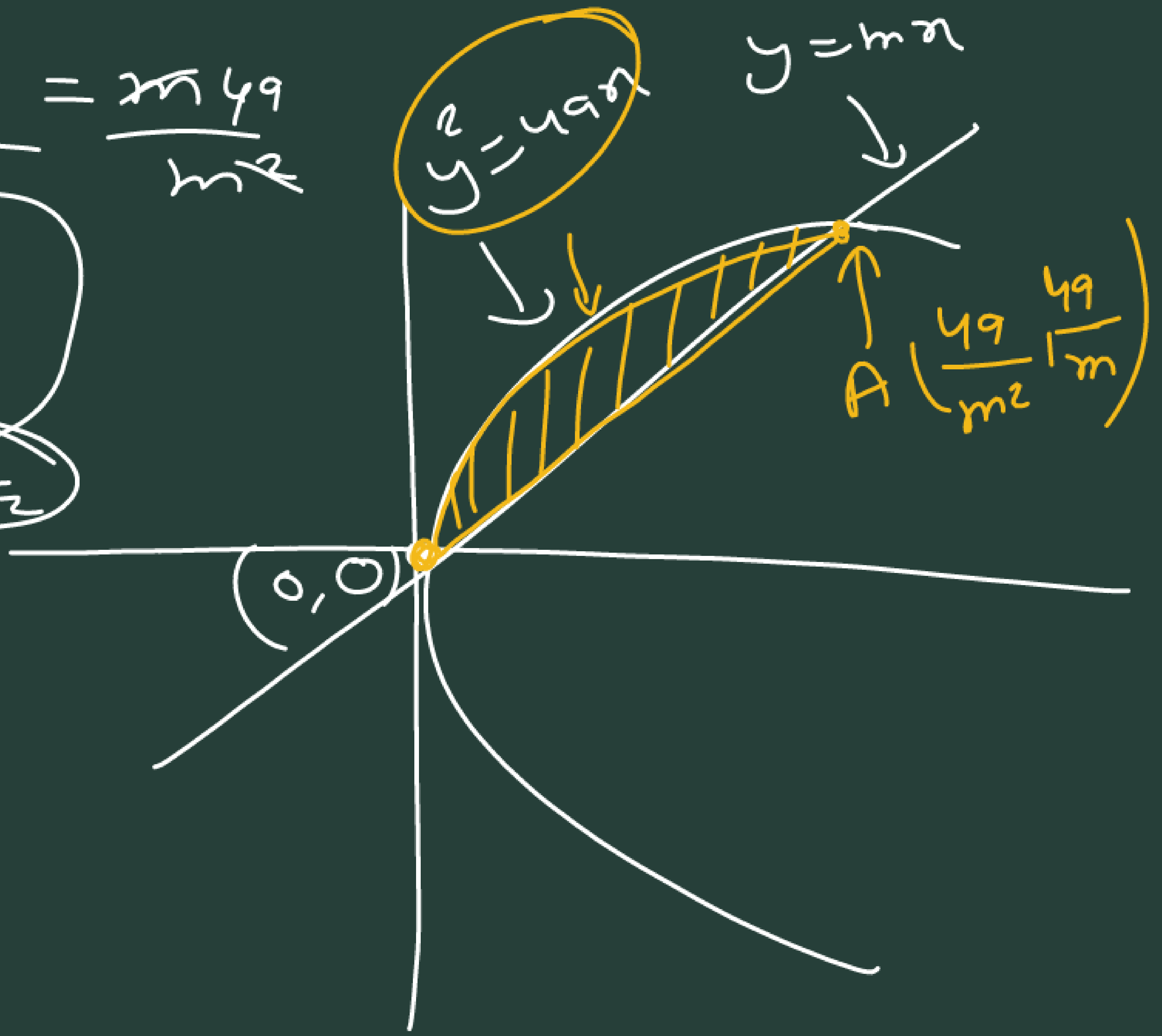
$m^2x^2 - 4ax = 0 \Rightarrow x(m^2x - 4a) = 0$

$\Rightarrow x = 0 \;\big|\; m^2x = 4a \Rightarrow x = \frac{4a}{m^2}$

Area $= \int_0^{\frac{4a}{m^2}} y \cdot dx$ (parabola) $- \int_0^{\frac{4m}{a^2}} y \cdot dx$ line

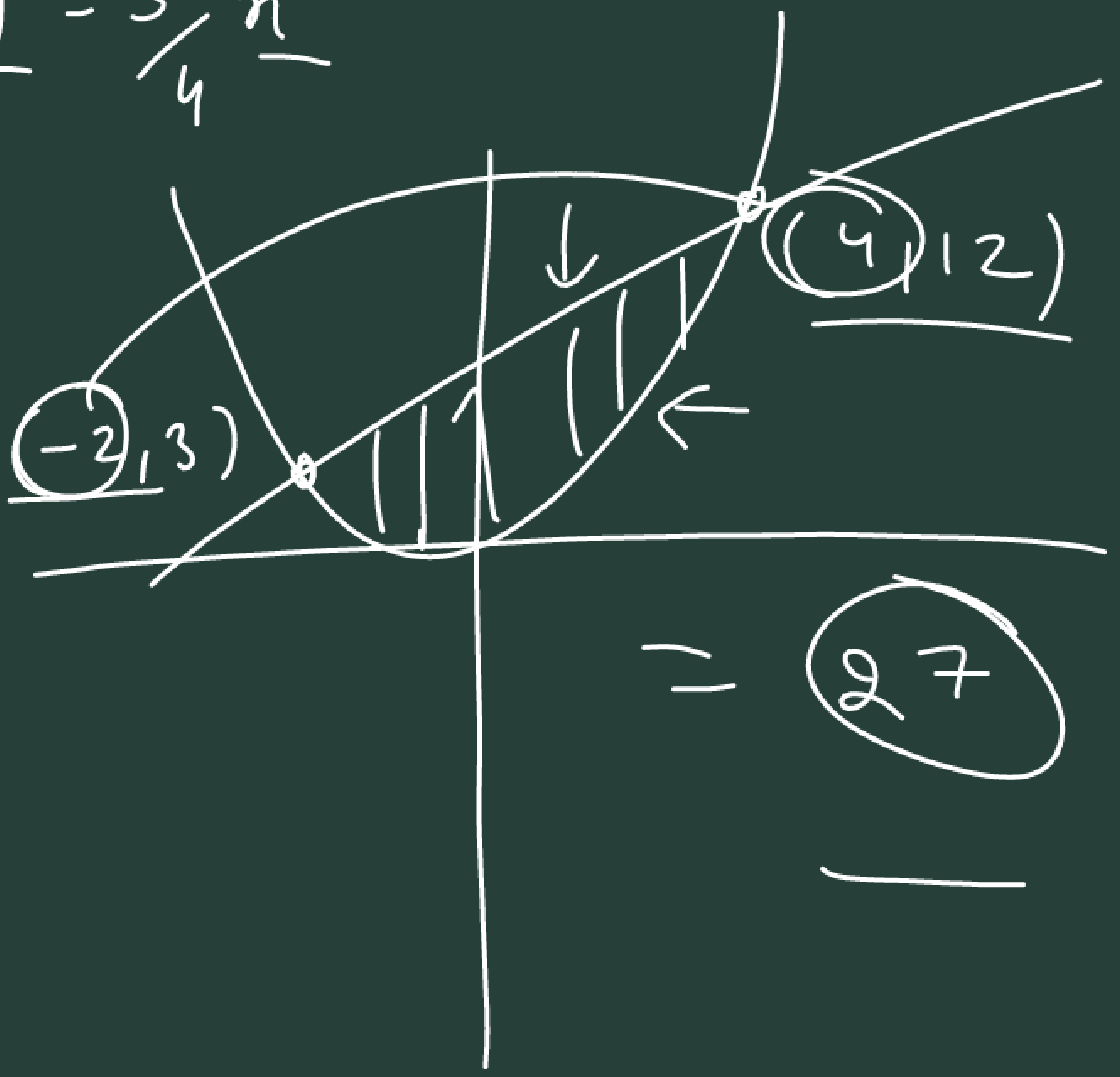
$\sqrt{4ax}$ $\qquad mx$

$\sqrt{2a} \cdot x^{1/2}$



Q. area enclosed by $4y = 3x^2$ & $2y = 3x + 12 \rightarrow y = \frac{3x}{2} + 6$

$y = \frac{3}{4}x^2$

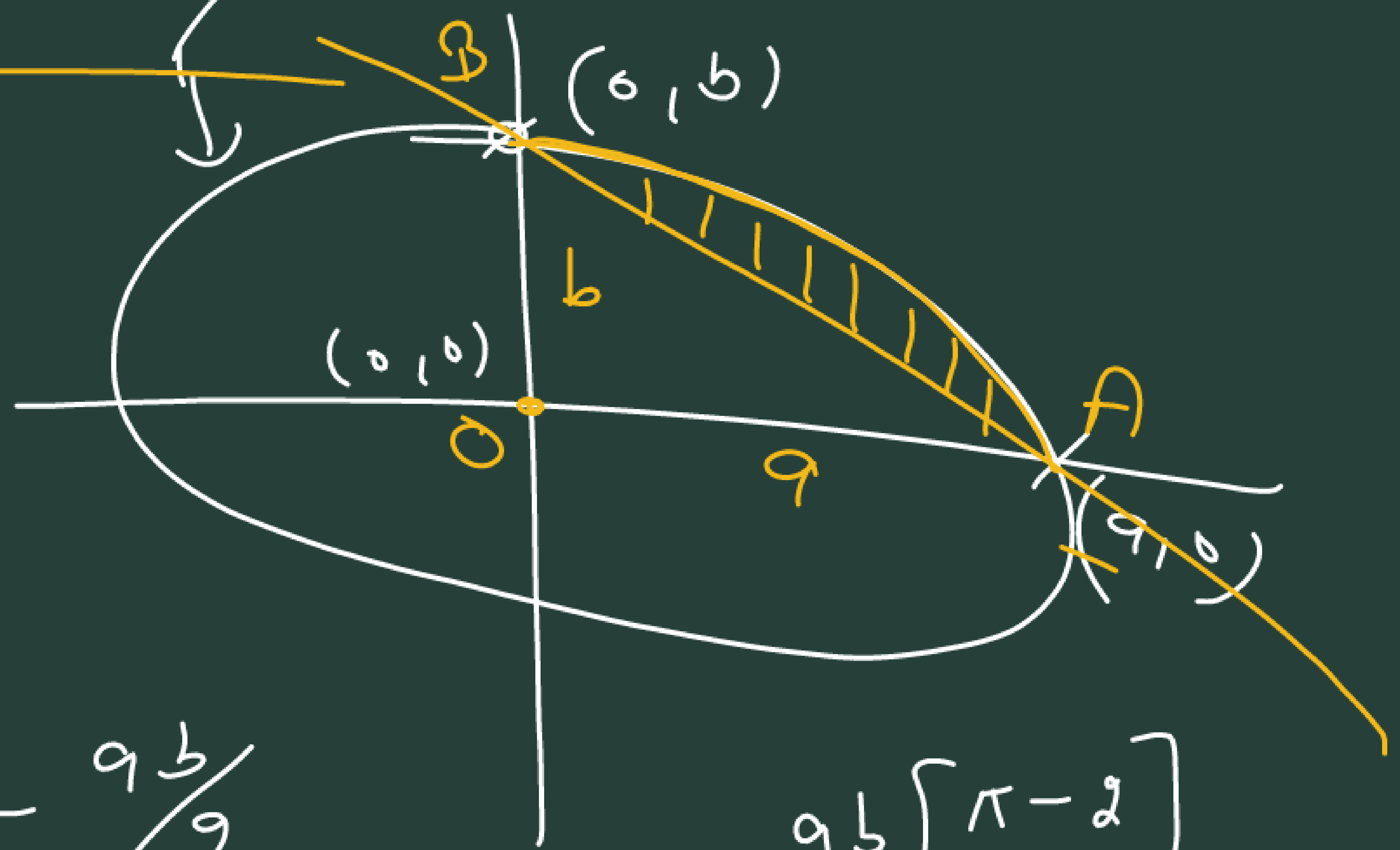


$= 27$

Q. Find area of $\boxed{\text{smaller region}}$ bounded by $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ &

line $\frac{x}{a}+\frac{y}{b}=1$ ✓

$y=b\sqrt{1-\frac{x^2}{a^2}}$



So Area $= \int_0^a \boxed{y\cdot dx}_{\text{ellipse}} - \int_0^a \underbrace{ar(OOABO)}_{y\cdot dx \text{ line}}$

$= \frac{b}{a}\int_0^a \sqrt{a^2-x^2} - \frac{1}{2}\times a\times b$

$= \frac{b}{a}\left[\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\frac{x}{a}\right]_0^a - \frac{ab}{2}$

$= \frac{b}{a}\left[\left\{0+\frac{a^2}{2}\cdot\frac{\pi}{2}\right\}-\left\{0+0\right\}\right] \Rightarrow ab\cdot\frac{\pi}{4}-\frac{ab}{2}$

$\frac{ab}{4}\left[\pi-2\right]$ Ans

$$\frac{x^2}{9} + \frac{y^2}{4} = 1 \quad \& \quad \frac{x}{3} + \frac{y}{2} = 1$$

$$a = 3 \quad b = 2$$

$$\frac{3 \times 2}{4}\left[\pi - 2\right]$$

Ques:- Using the method of integration find area bounded by the curve :- $|x| + |y| = 1$.

Sol:- $|x| + |y| = 1$

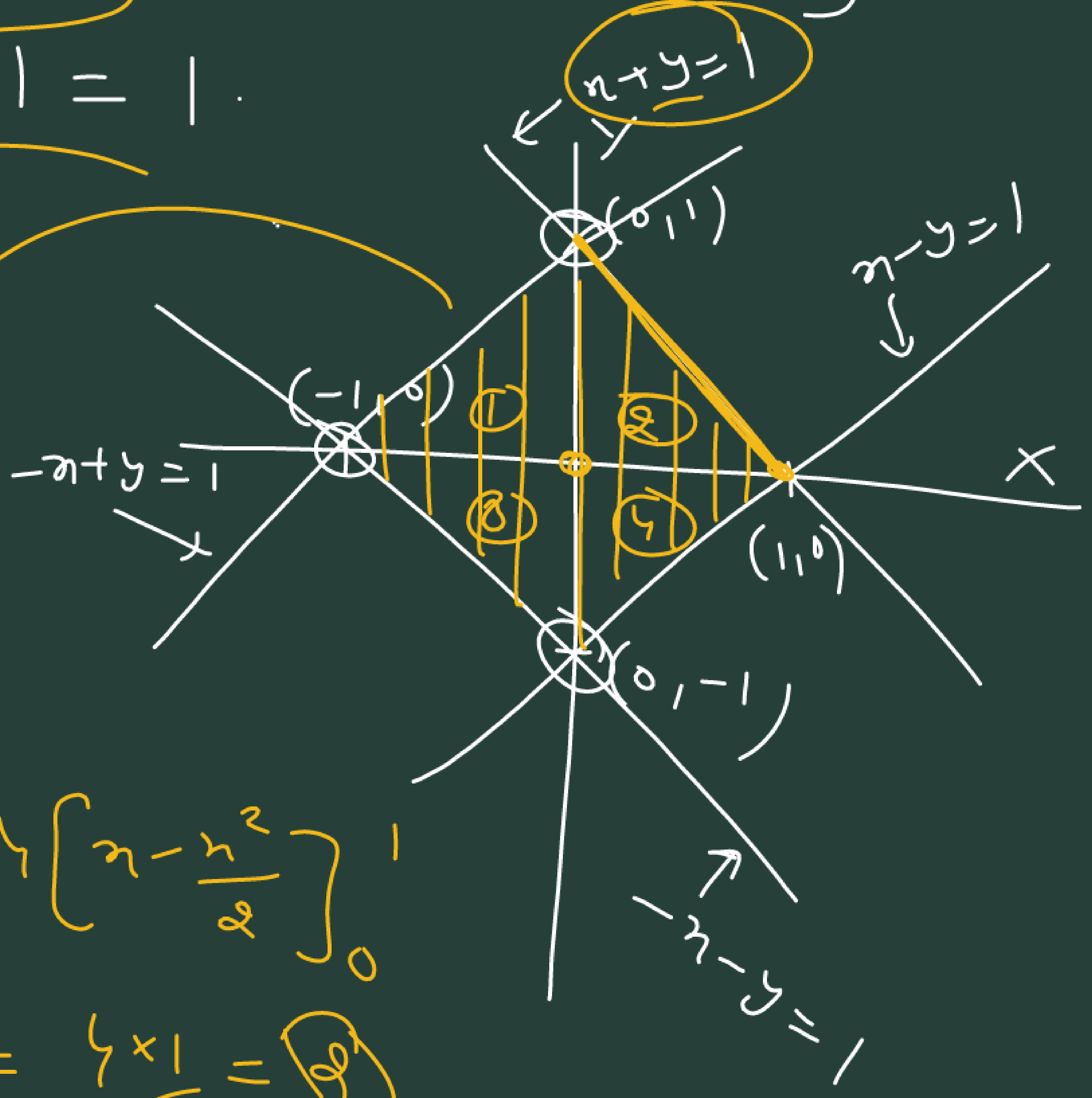
$x > 0, y > 0 \to x + y = 1$ — (1)

$x > 0, y < 0 \to x - y = 1$

$x < 0, y > 0 \to -x + y = 1$

$x < 0, y < 0 \to -x - y = 1$

$\frac{\cancel{4}^{2} \times 1 \times 1}{\cancel{2}} \times |x|$



$$\text{So area} = 4\int_0^1 \underbrace{y\,dx}_{\text{line}} = 4\left[\int 1 - x\right]_0^1 = 4\left[x - \frac{x^2}{2}\right]_0^1$$

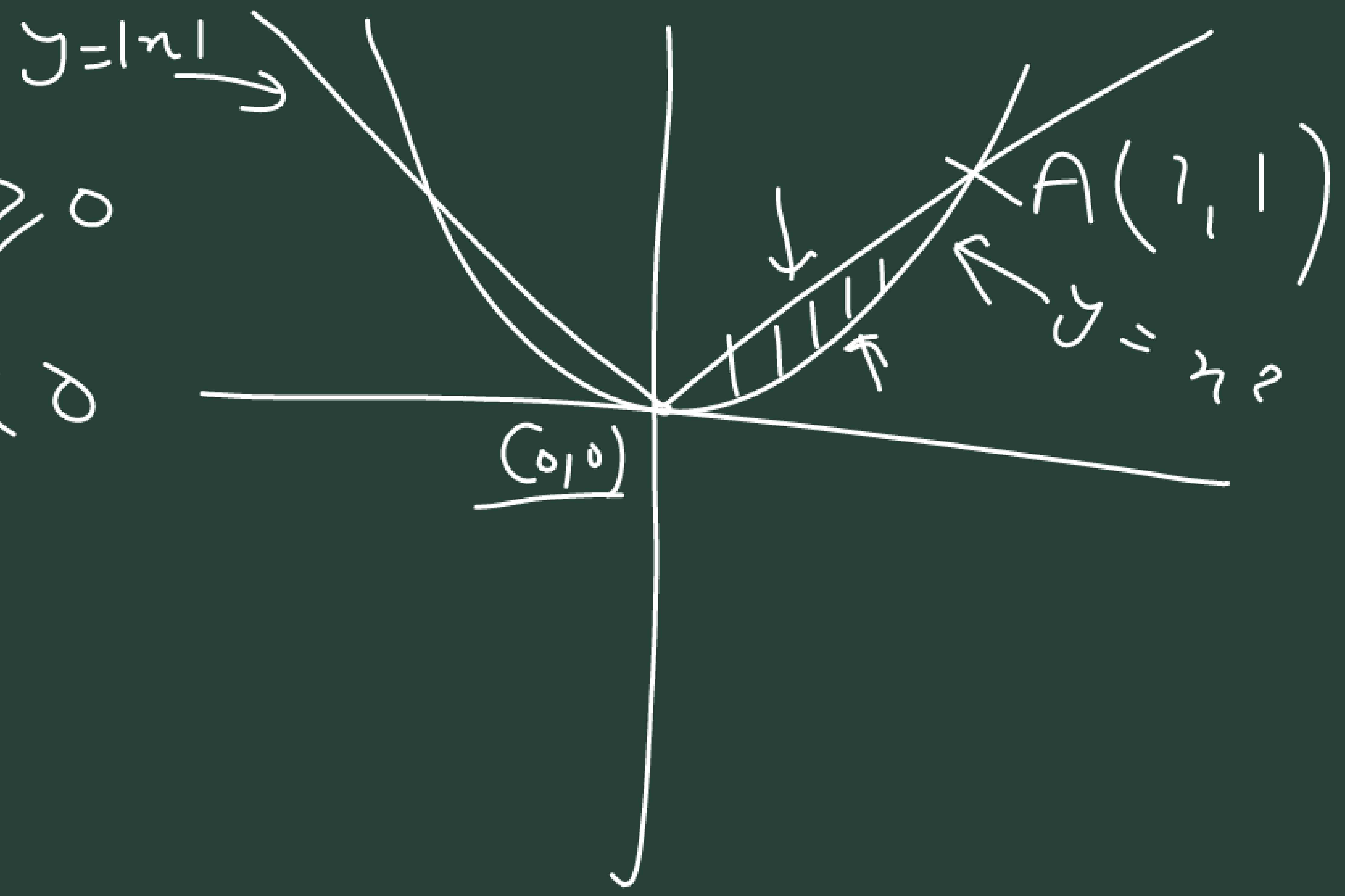
$$= 4\left[1 - \frac{1}{2}\right] = 4 \times \frac{1}{2} = 2$$

Find area bounded by curves:- $\{(x,y) : y \geq x^2 \text{ \& } y = |x|\}$

Sol^n:- $y = x^2$ & $y = |x|$

$\boxed{y = x^2}$

$$y = \begin{cases} x & : x \geq 0 \\ -x & ; x < 0 \end{cases}$$



Q. Area bounded by $y = x^3$ & x-axis & coordinates $x = -2$ & $x = 1$

Sol^n:- $\boxed{y = x^3}$

x	0	1	2
y	0	1	8

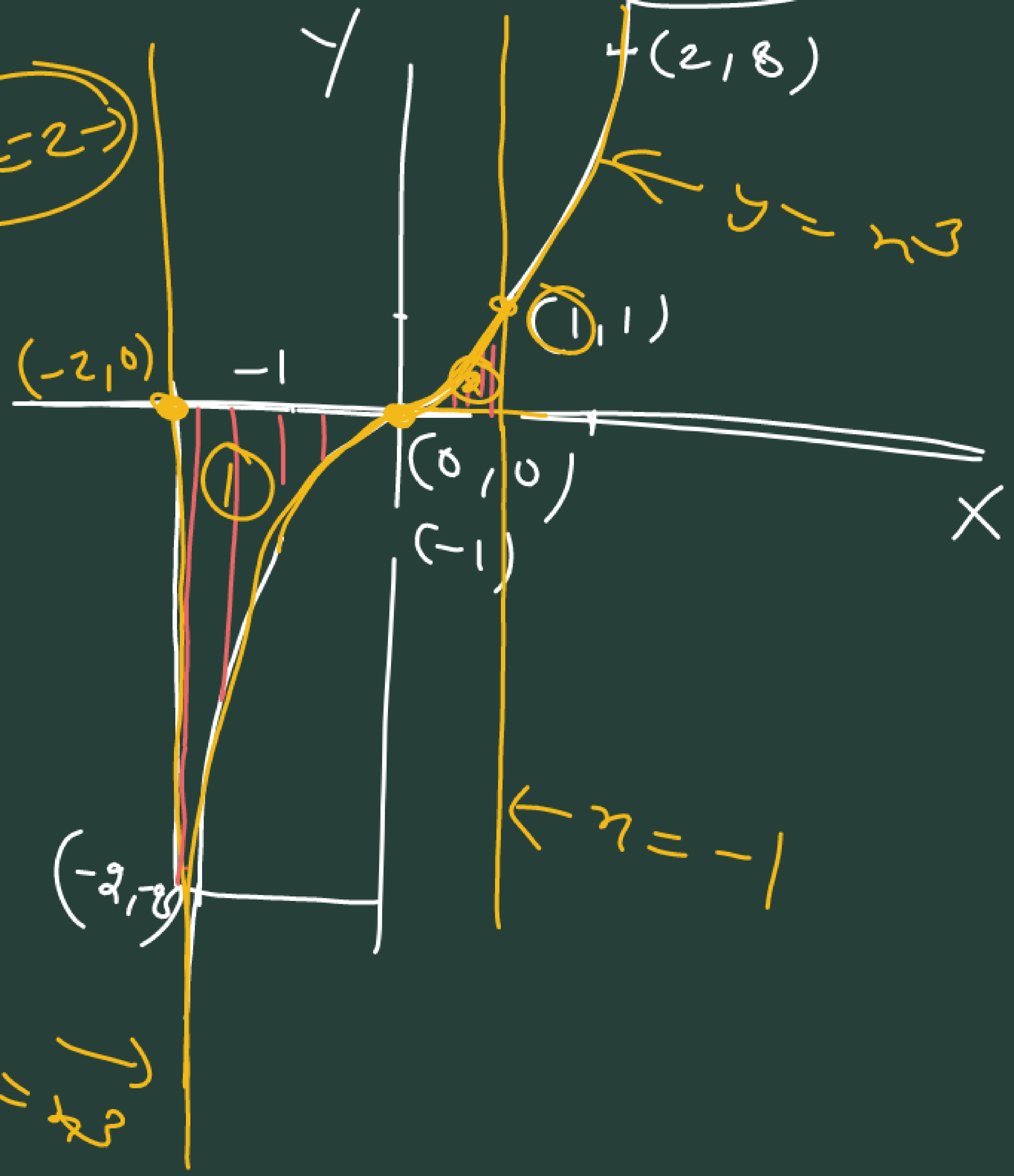
$$\text{Area} = \int_{-2}^{0} \underline{y \cdot dx} + \int_{0}^{1} \underline{y \cdot dx}$$

$$= \int_{-2}^{0} x^3 \cdot dx + \int_{0}^{1} x^3 \cdot dx$$

$$= \left[\frac{x^4}{4}\right]_{-2}^{0} + \left(\frac{x^4}{4}\right)_{0}^{1}$$

$x = 2 -$

& $17/4$



$y = x^3$