Nishant Jindal

1:

$$|x+y| = 10$$

$$\log_{10} \frac{y}{|x|} = \log_{10} 2 \Rightarrow \frac{y}{|x|} = 2.$$

$$|x + 2|x|| = 10$$

$x < 0$ $\quad |-x| = 10 \Rightarrow x = \pm 10, \ \boxed{x = -10}$

$x \geq 0$ $\quad |3x| = 10 \Rightarrow x = \pm \frac{10}{3}, \ \boxed{x = \frac{10}{3}}$

Nishant Jindal

3.

$$\frac{\log_2 \log_{8=2^3}(x^2+7)}{\log_2\left(3/4\right)} - \log_2 \log_{\frac{1}{4}}\left(x^2+7\right)^{-1} = -2$$

$$\log_2 \log_2 (x^2+7) = t$$

$$\frac{\log_2\left(\frac{1}{3}\log_2(x^2+7)\right)}{\log_2 3 - 2} - \log_2\left(\frac{1}{2}\log_2(x^2+7)\right) = -2$$

$$\frac{\log_2\left(\log_2(x^2+7)\right) - \log_2 3}{\log_2 3 - 2} - \left(\log_2\left(\log_2(x^2+7)\right) - 1\right) = -2$$

$$\frac{t - \log_2 3}{\log_2 3 - 2} = t - 3$$

$$t - \log_2 3 = t(\log_2 3 - 2) - 3\log_2 3 + 6$$

$$t(3 - \log_2 3) = 6 - 2\log_2 3$$

$$t = 2$$

Nishant Jindal

5.

$$\ln 2(\ln 2+\ln x)=\ln 3(\ln 3+\ln y)$$

$$\ln x\ln 3=\underline{\ln y}\ln 2$$

$$\boxed{y=\frac{1}{3}}$$

$$\ln^2 2+\ln 2\ln x=\ln^2 3+\frac{\ln^2 3\ln x}{\ln 2}$$

$$\Rightarrow \ln x\left(\ln 2-\frac{\ln^2 3}{\ln 2}\right)=\ln^2 3-\ln^2 2.$$

$$\ln x\left(\frac{\ln^2 2-\ln^2 3}{\ln 2}\right)=\ln^2 3-\ln^2 2$$

$$\ln x=-\ln 2$$

$$\boxed{x=\frac{1}{2}}$$

Nishant Jindal

$x \in (-1, 1)$

$$y = \sqrt{4 - \frac{1}{3\sqrt{2}}\underbrace{\sqrt{4 - \frac{1}{3\sqrt{2}}\sqrt{\quad}}}}$$

$x \in (-\infty, -1] \cup [1, \infty)$

$3x^2 - 4(x^2 - 1) + x - 1 = 0$

$x^2 - x - 3 = 0$

$\frac{1 \pm \sqrt{13}}{2}$ ✓

$$y = \sqrt{4 - \frac{1}{3\sqrt{2}}y}$$

$$y^2 + \frac{1}{3\sqrt{2}}y = 4$$

Nishant Jindal

$$f(x) = y = x^n \quad , x \geq 0$$

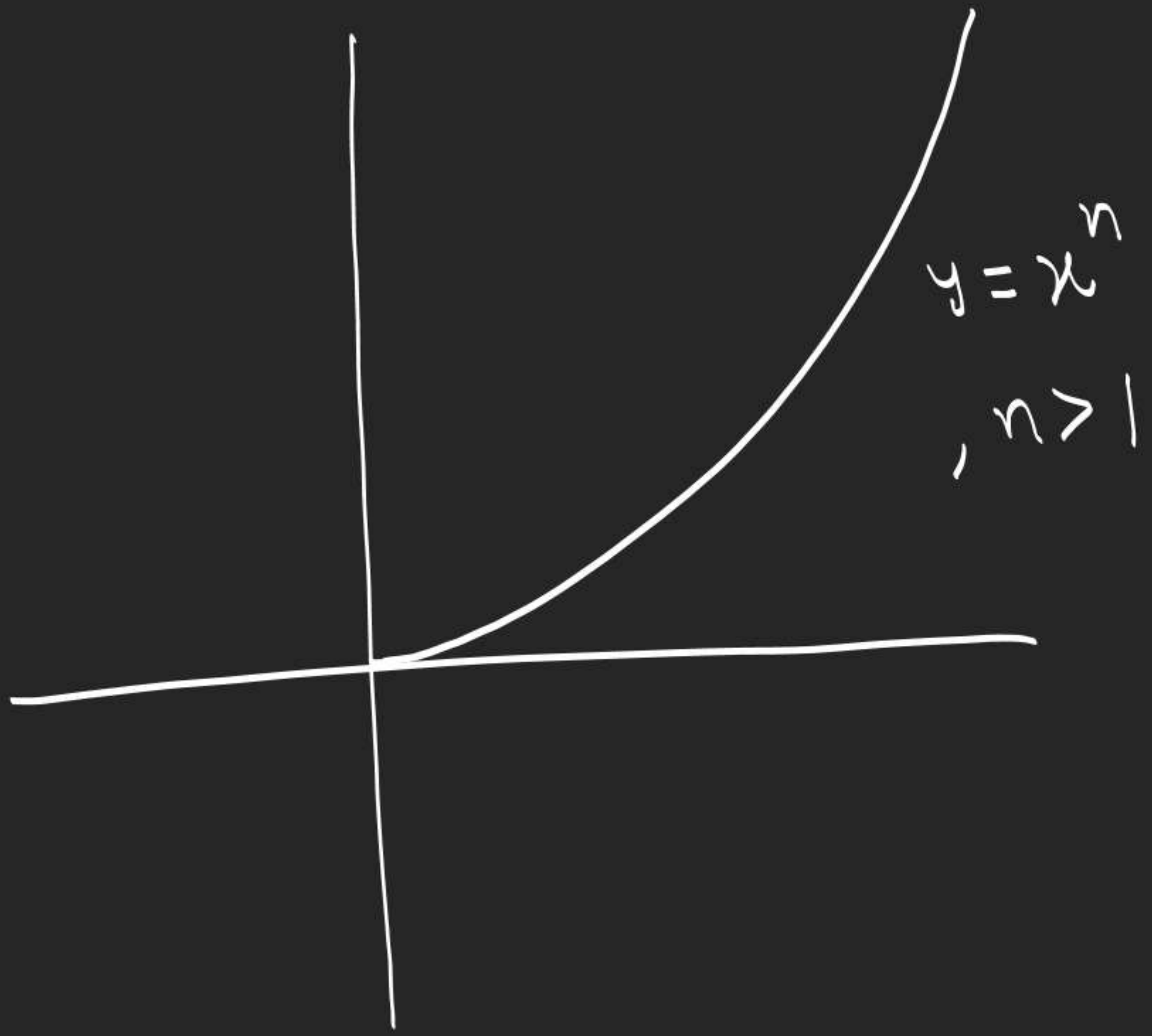
$$\underline{n > 1}$$

$$f'(x) = \underline{n}x^{n-1} > 0$$

$$f''(x) = n(n-1)x^{n-2} > 0$$

$$x = 0 , \ f(0) = 0$$

$$x \to \infty , \ f(x) \to \infty$$



Nishant Jindal

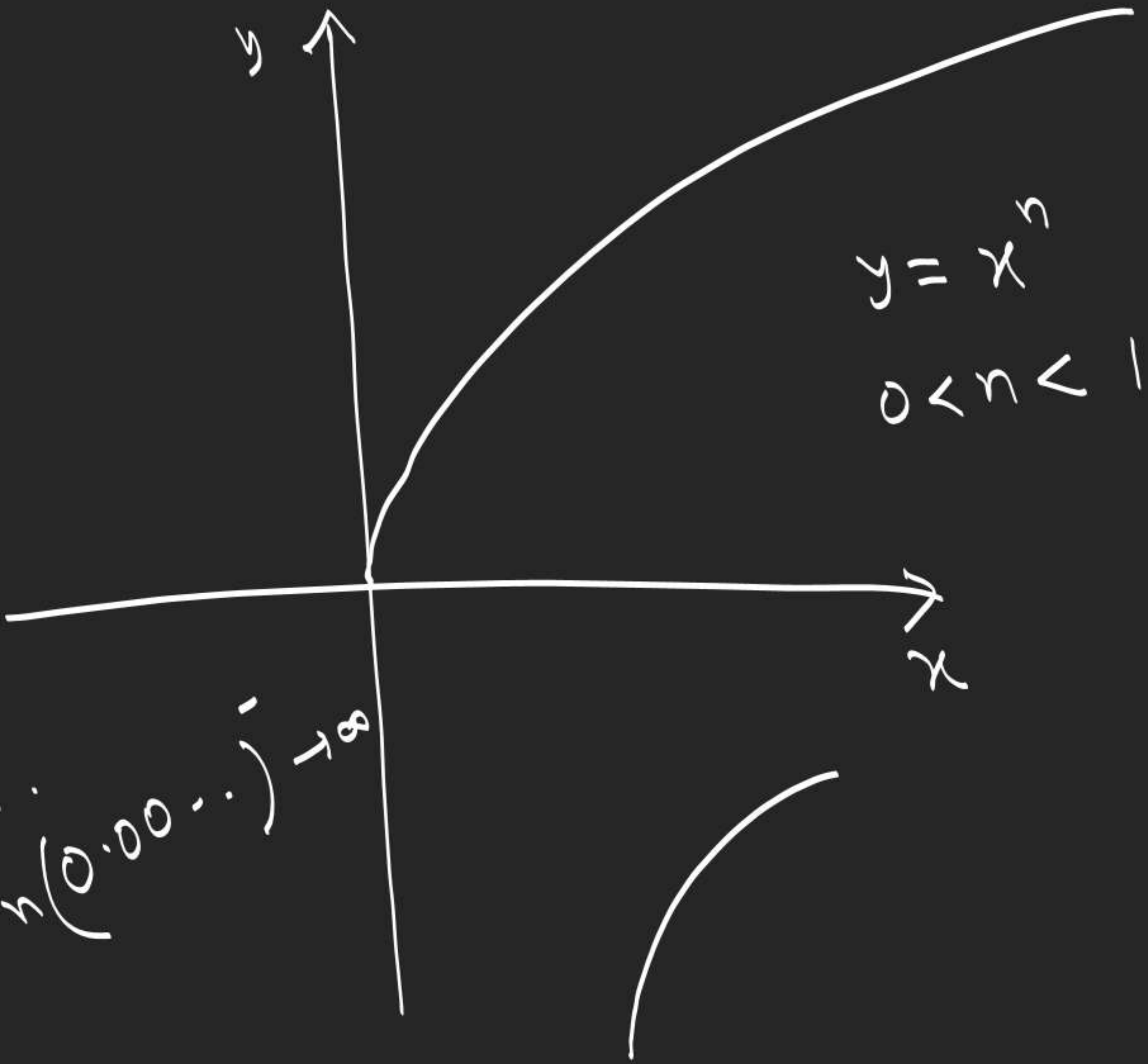
$f(x) = x^n \quad , x \geq 0 , \quad 0 < n < 1$

$f'(x) = nx^{n-1} > 0$

$f''(x) = n(n-1)x^{n-2} < 0$

$x = 0 , \quad f(x) = 0$

$x \to \infty , \quad f(x) \to \infty$



$x \to 0$

$x = 0.000\ldots$

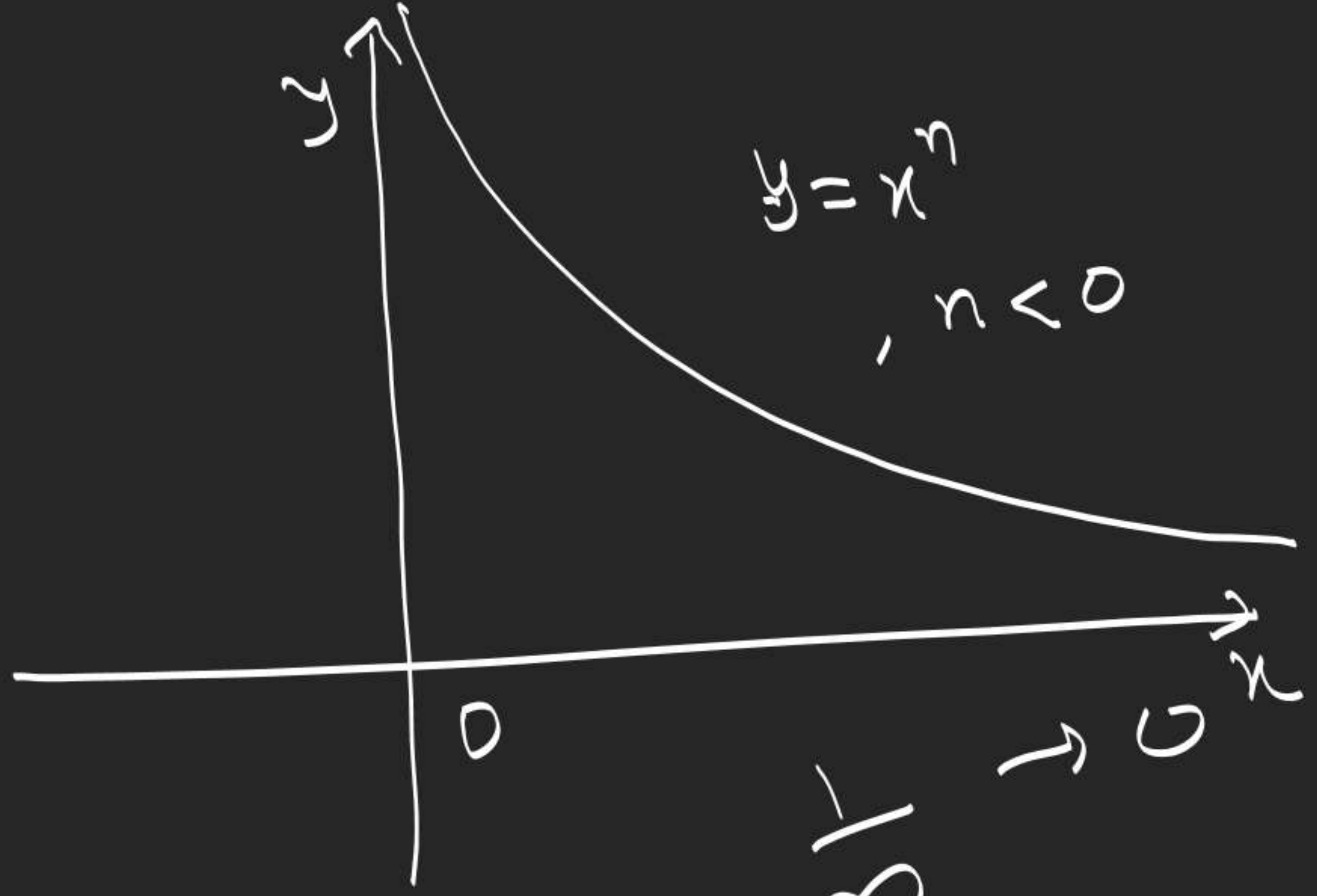
$f'(x) \quad n(0.00\ldots)^{-} \to \infty$

Nishant Jindal

$f(x) = y = x^n, x \geq 0, n < 0$

$f'(x) = nx^{n-1} < 0$

$f''(x) = n(n-1)x^{n-2} > 0$



$x \to 0^+, y \to \infty$

$x \to \infty, y \to 0$

$(0.000\ldots)^{-2}$

∞^{-2}

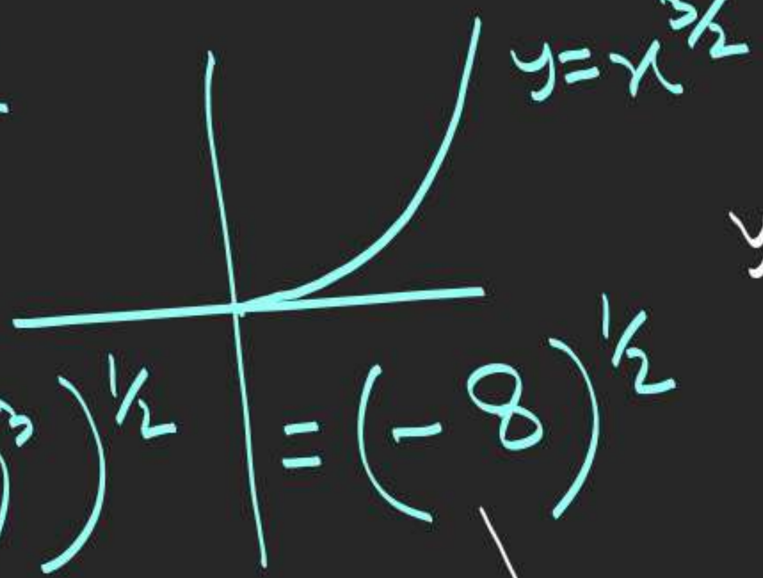
$\frac{1}{\infty^2}$

$\frac{1}{\infty} \to 0$

Nishant Jindal

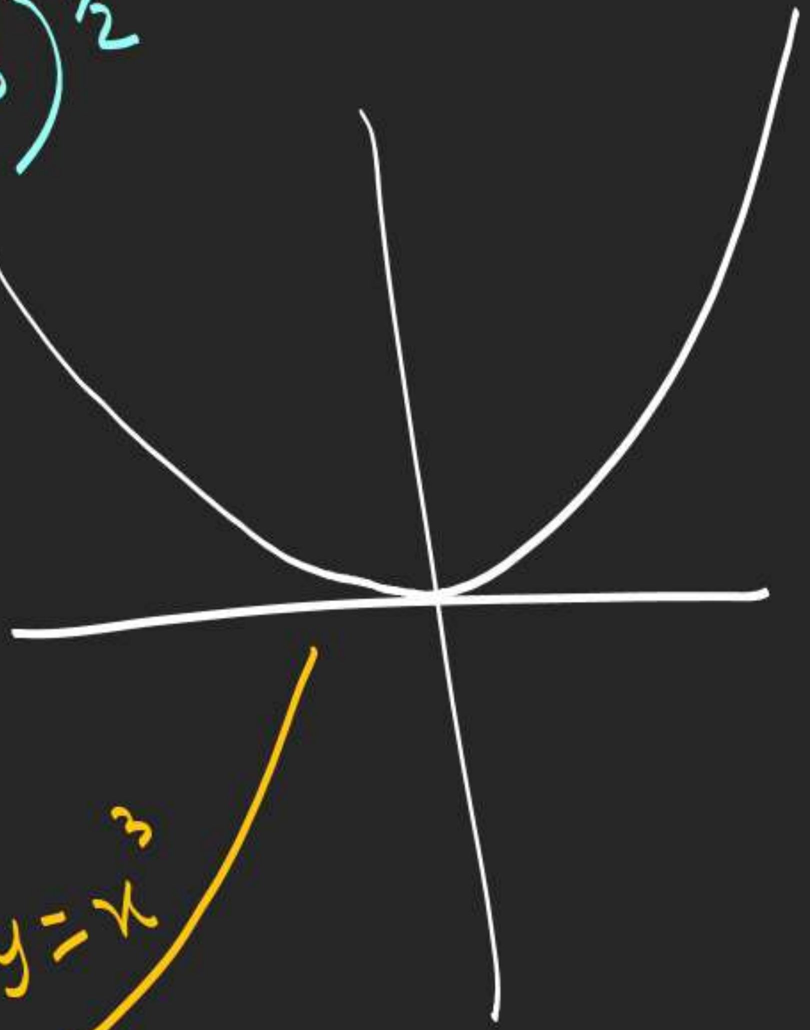
$y = x^2$

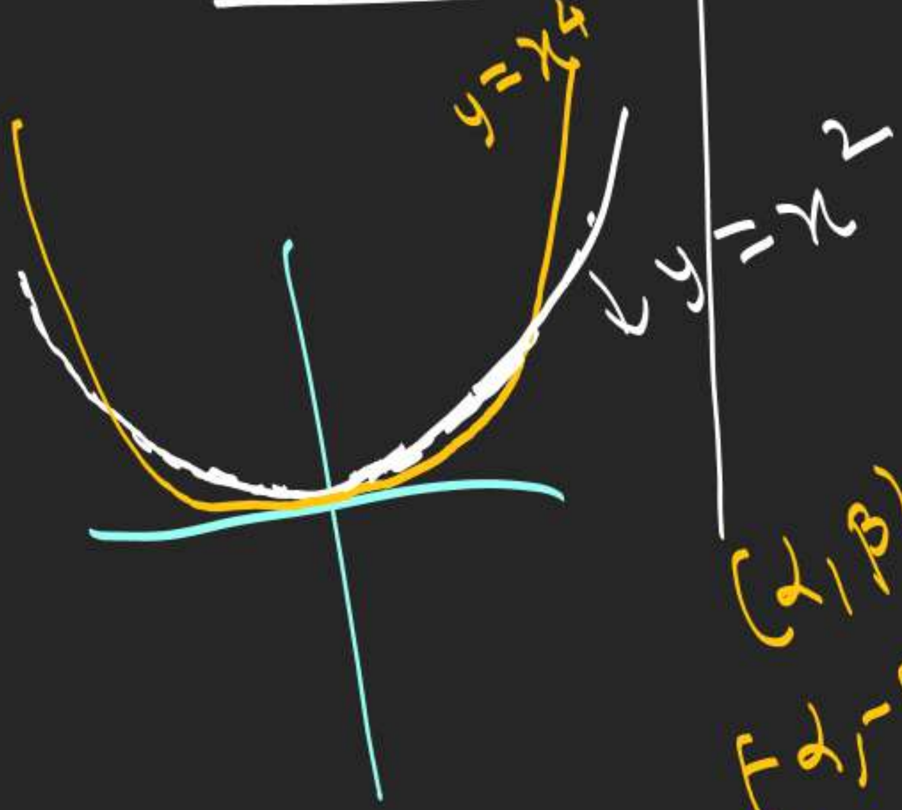
$y = x^{3/2}$



$(-2)^{3/2} = \left((-2)^3\right)^{1/2} = (-8)^{1/2}$

$y = x^4$



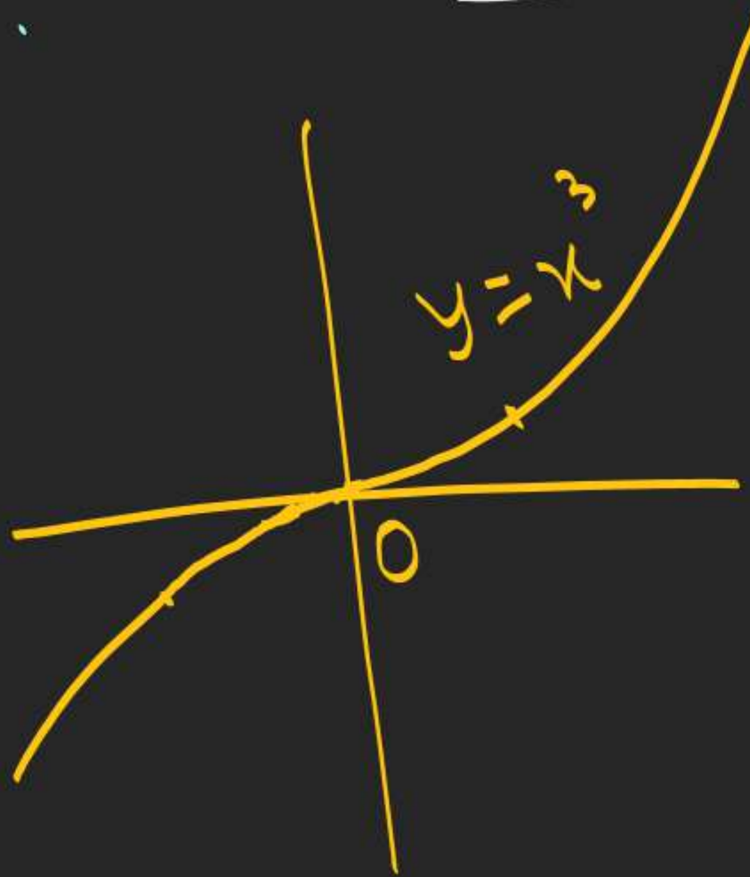


$(-\alpha, \beta)$

$y = x^3$

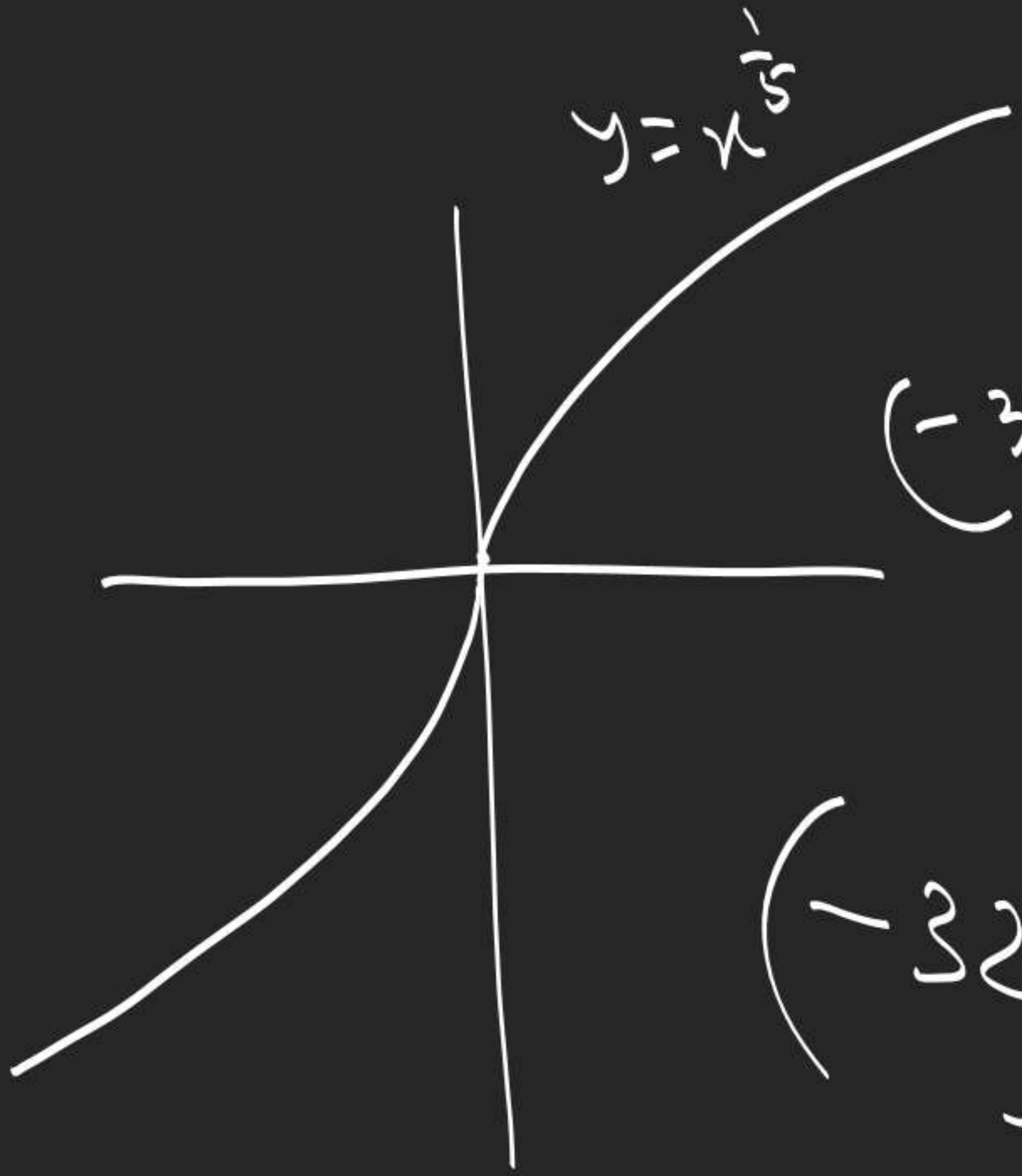
(α, β)

$(-\alpha, -\beta)$



Nishant Jindal

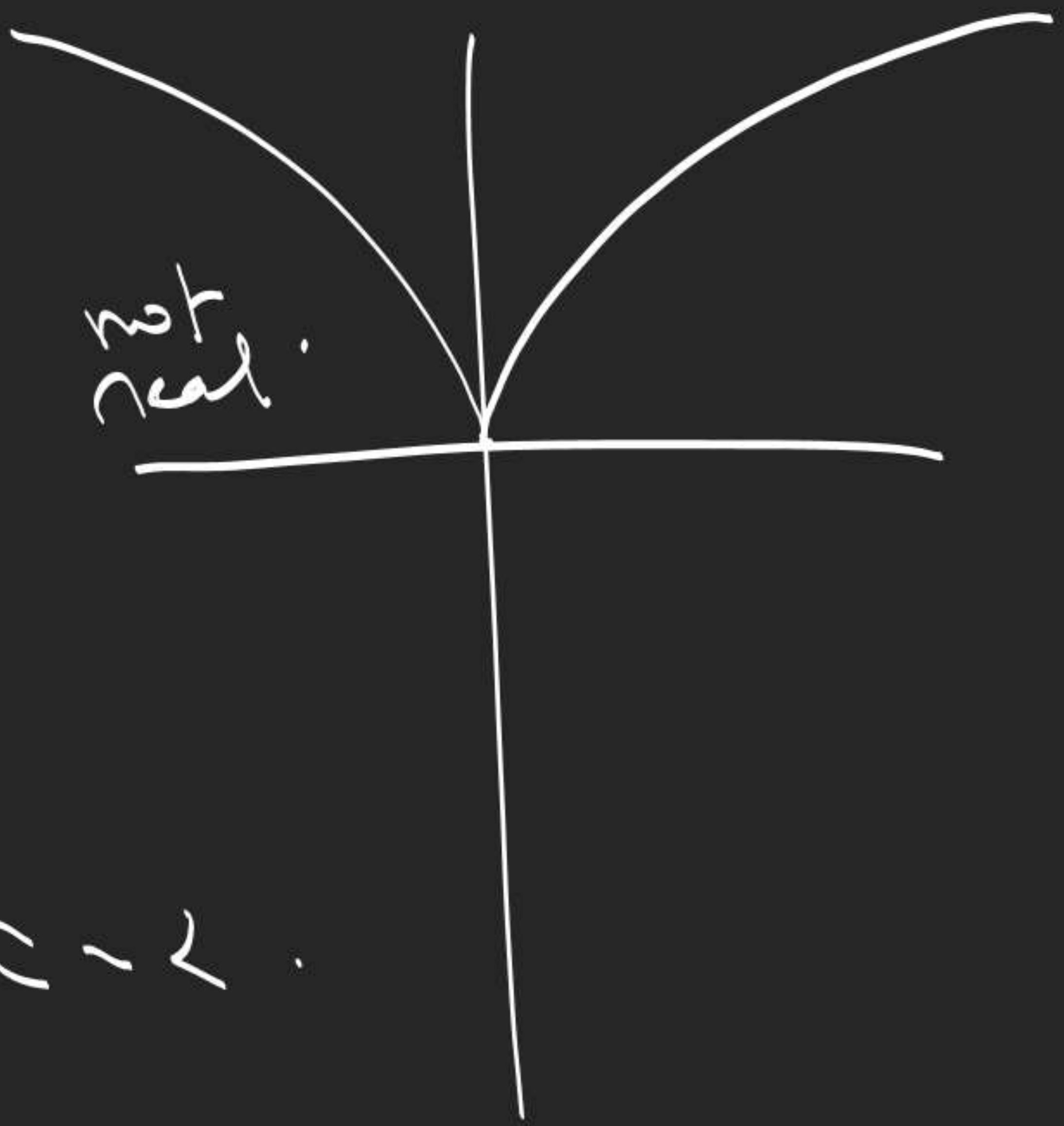
$y = x^{\frac{1}{5}}$



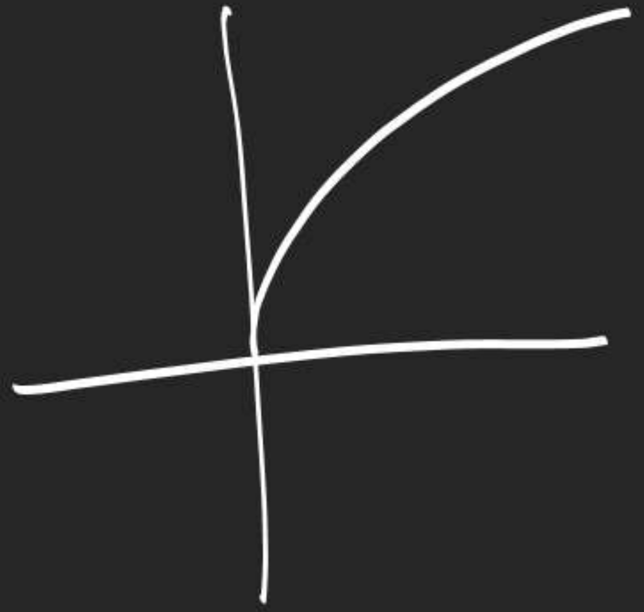
$(-32)^{1/4}$ not real.

$(-32)^{1/5} = -2.$

$y = x^{2/3}$

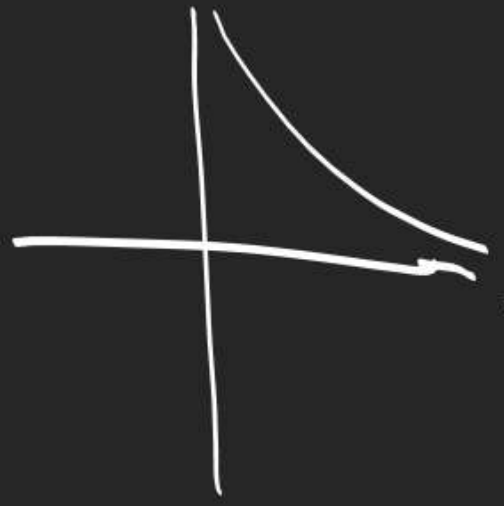


$y = x^{\frac{3}{4}}$

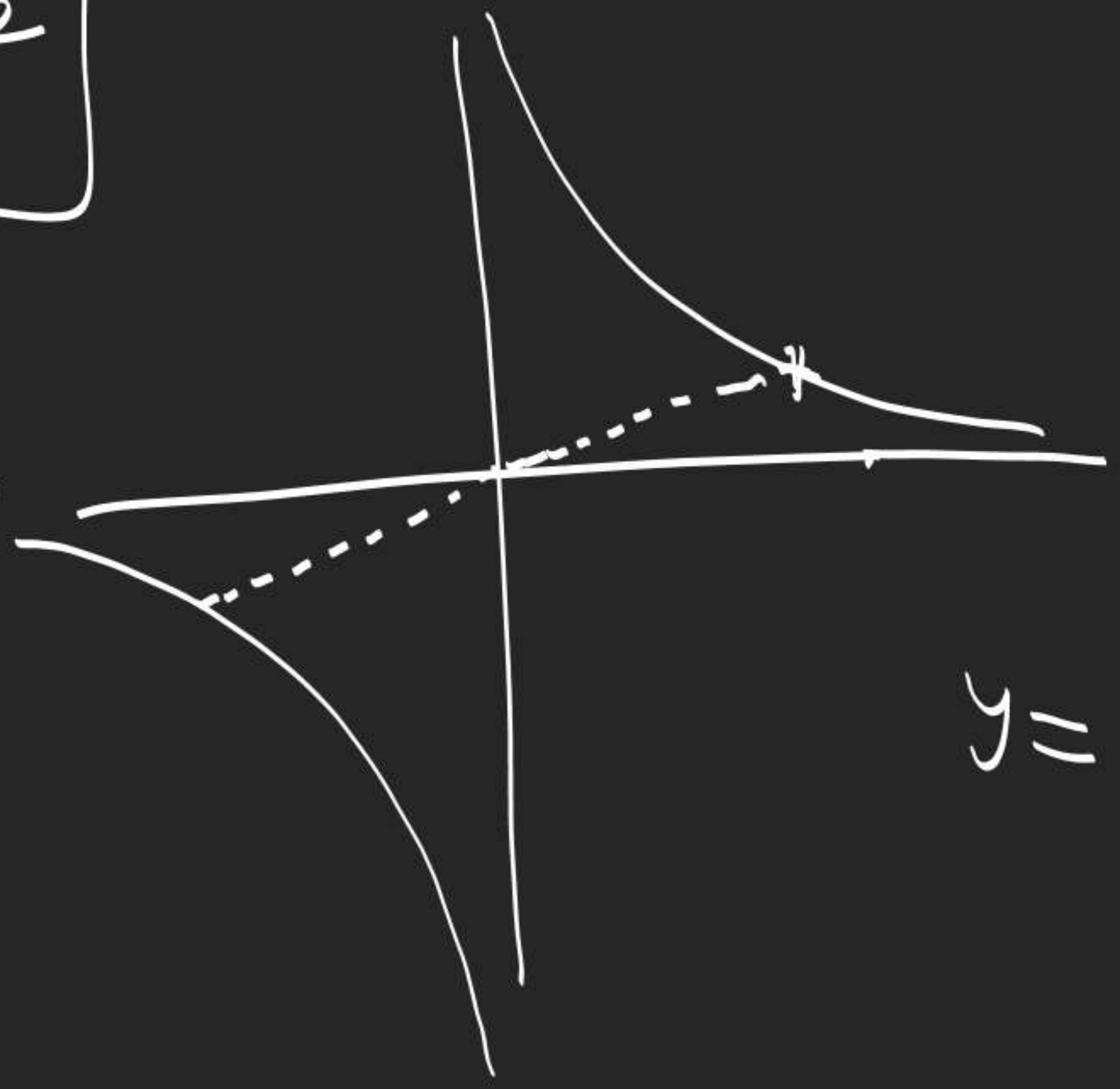


Nishant Jindal

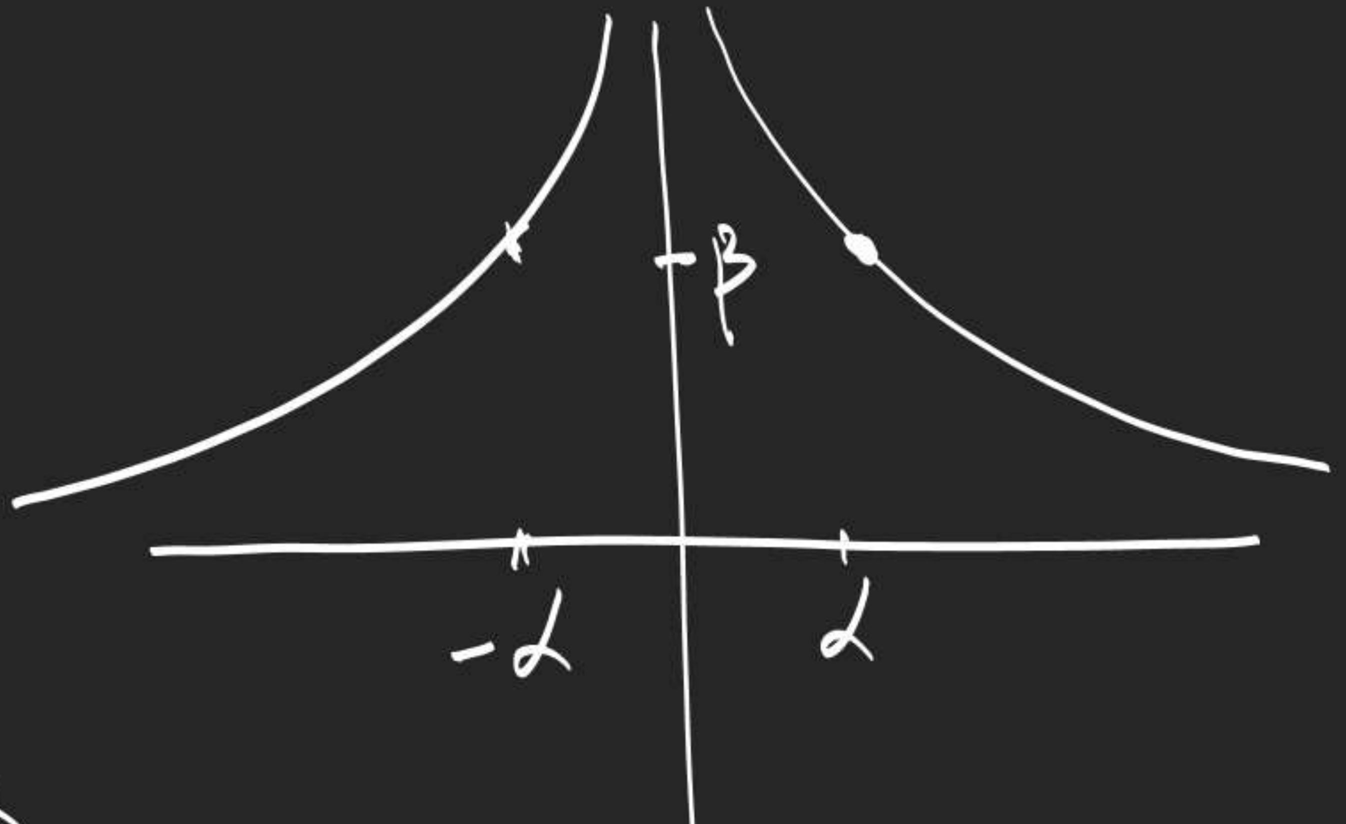
$$\boxed{y = x^{-3/2}}$$



$$y = \frac{1}{x}$$



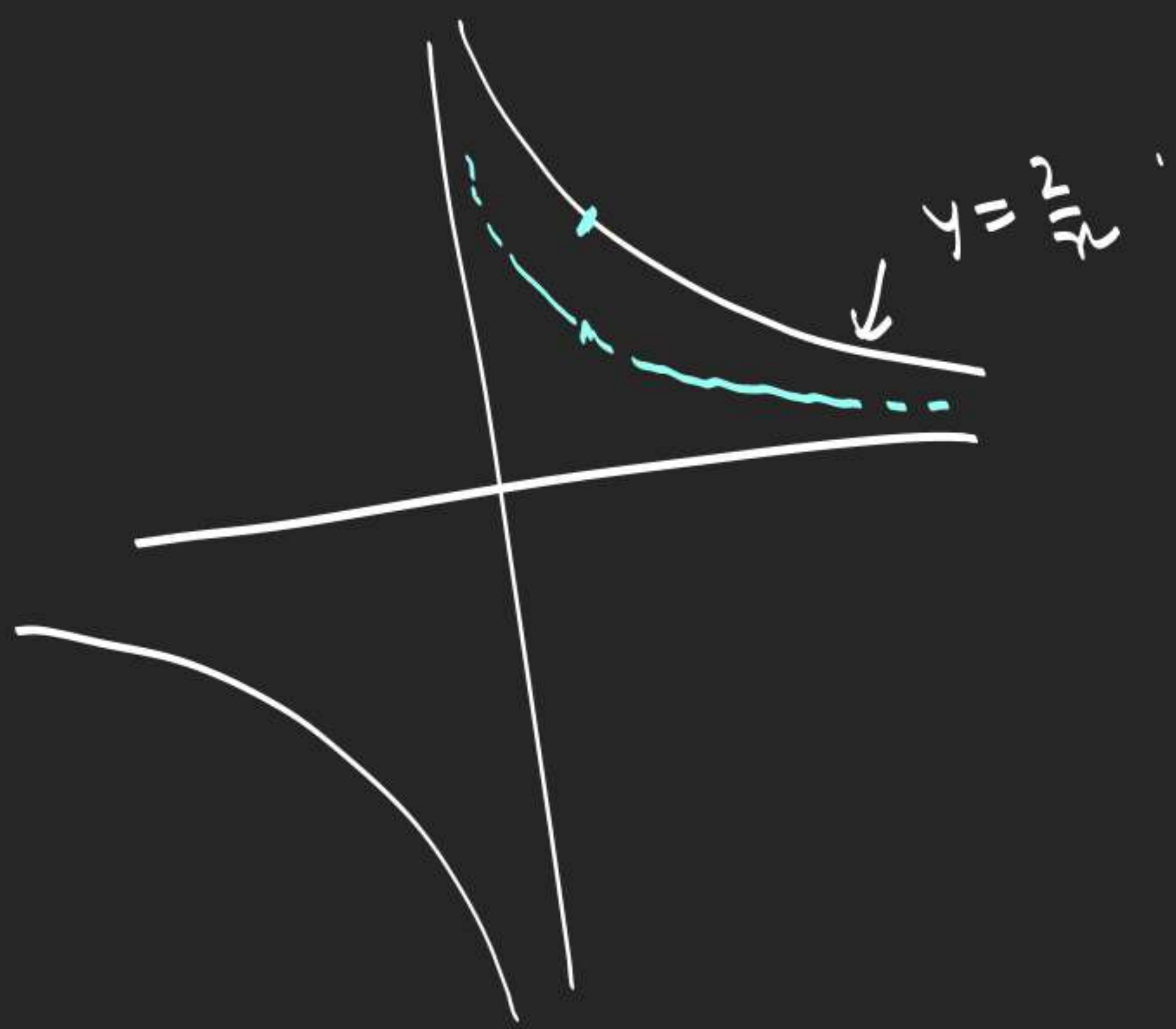
$$y = \frac{1}{x^4}$$



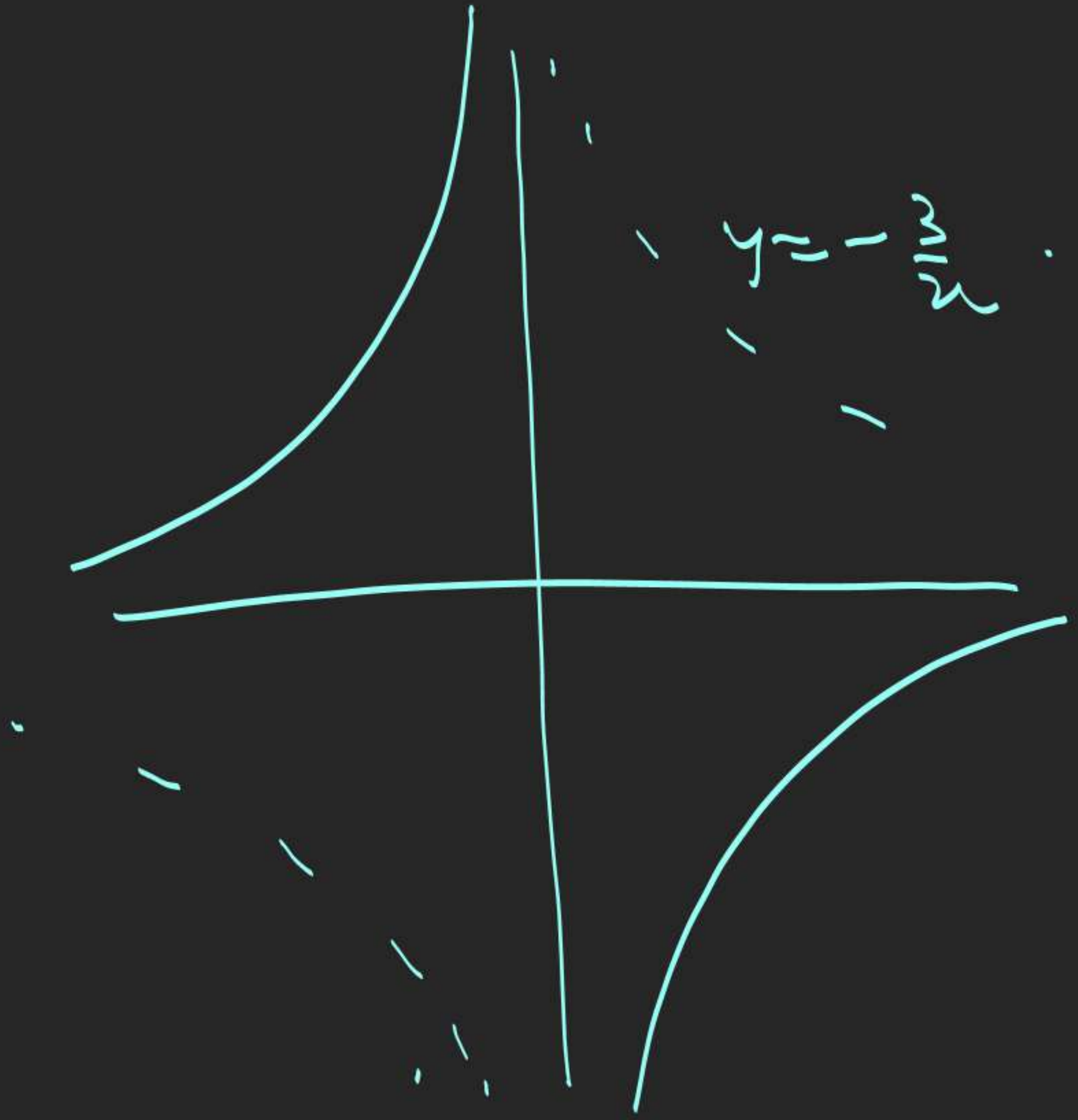
$$y = x^{-3}$$

Nishant Jindal

$$y = \frac{2}{x}$$

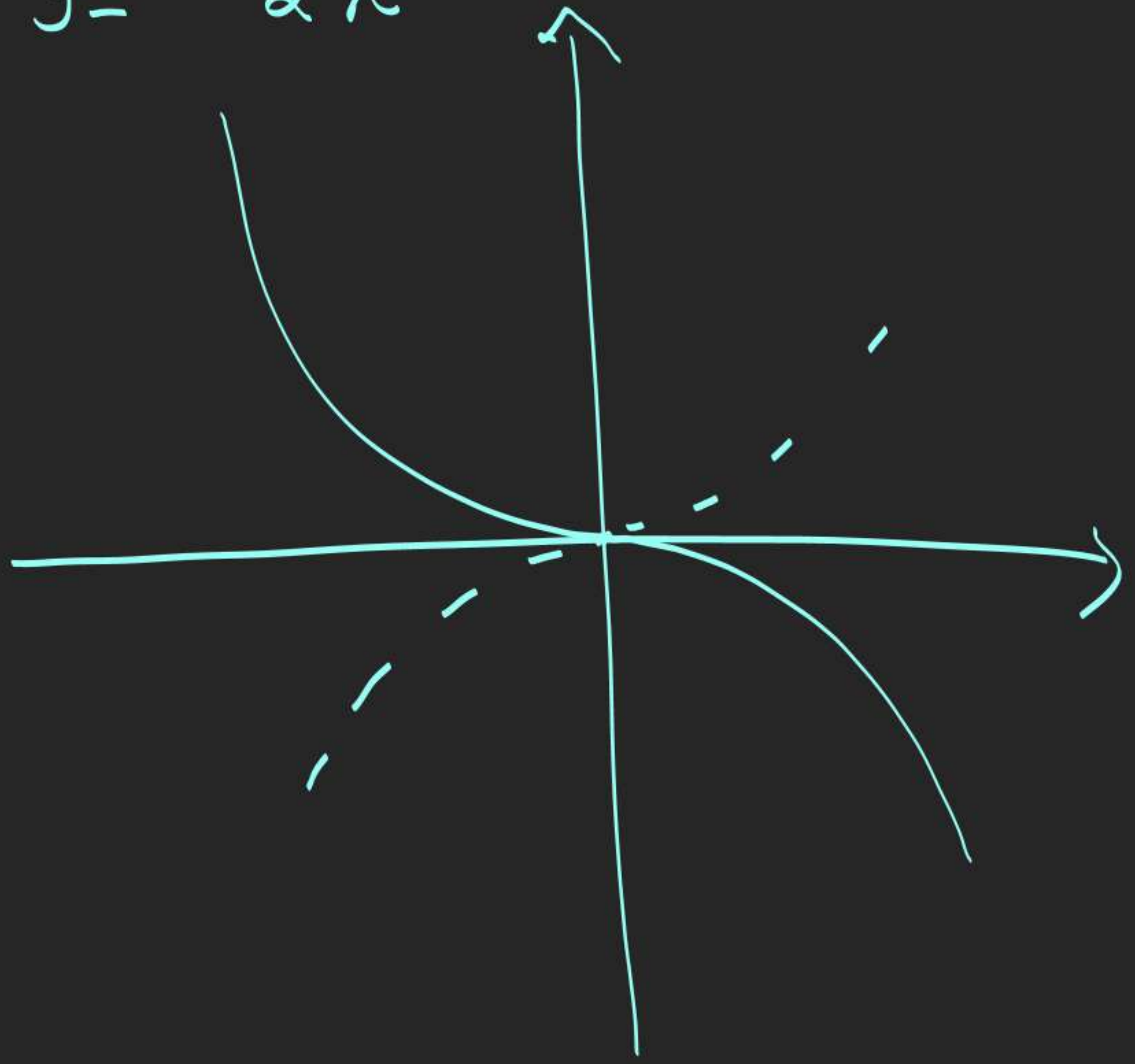


$$y = -\frac{3}{x}$$



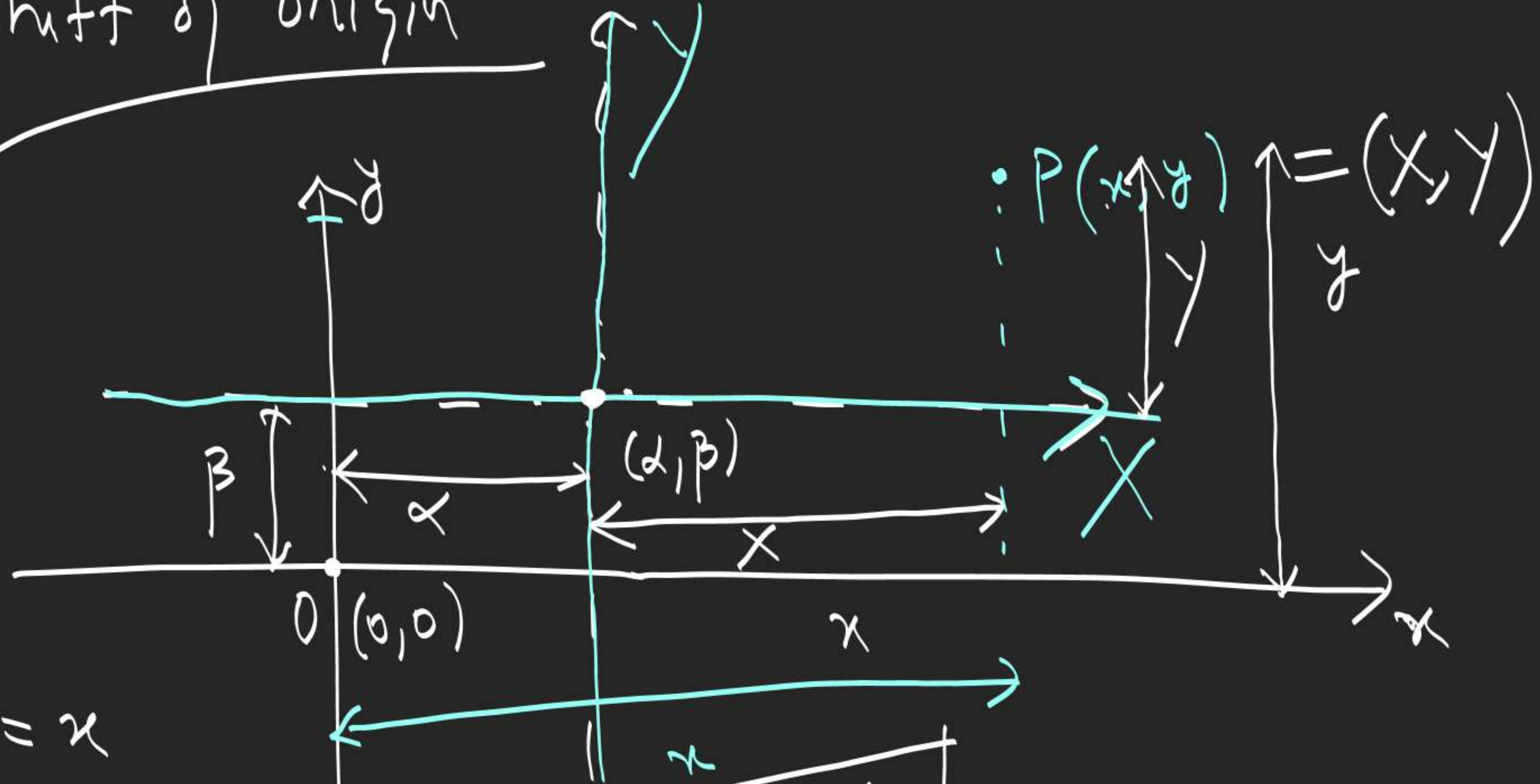
Nishant Jindal

$y = -2x^3$



Nishant Jindal

Shift of origin



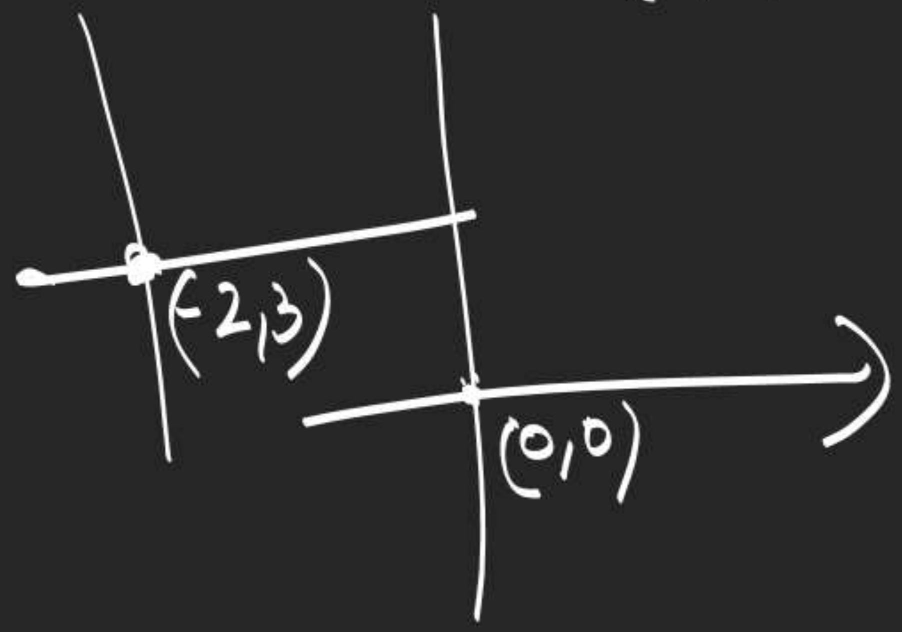
$\alpha + X = x$

$\beta + Y = y.$

$$\boxed{\begin{aligned} x - \alpha &= X \\ y - \beta &= Y \end{aligned}}$$

Nishant Jindal

$(5,5) * P =$



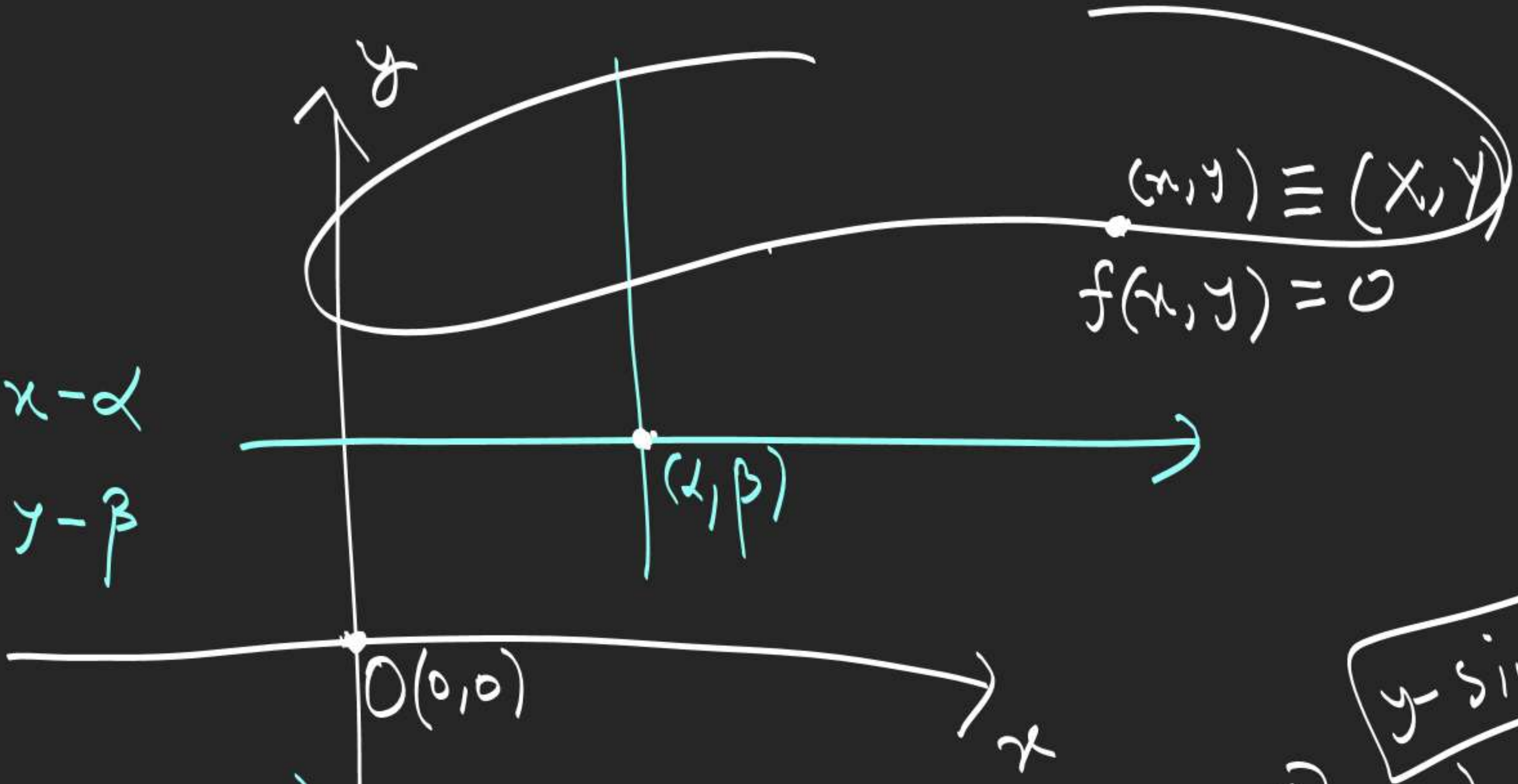
P

$$(X, Y) = (x-\alpha,\ y-\beta)$$

$$= (5-(-2),\ 5-3)$$

$$= (7, 2)$$

Nishant Jindal



$$X = x - \alpha$$
$$Y = y - \beta$$

$$f(X+\alpha,\ Y+\beta) = 0.$$

$$\boxed{g(X, Y) = 0}$$

$y = \sin x \Rightarrow (x, \sin x)$

$\boxed{y - \sin x = 0}$

$\boxed{f(x, y) = 0}$

Nishant Jindal

$x + y = 2.$

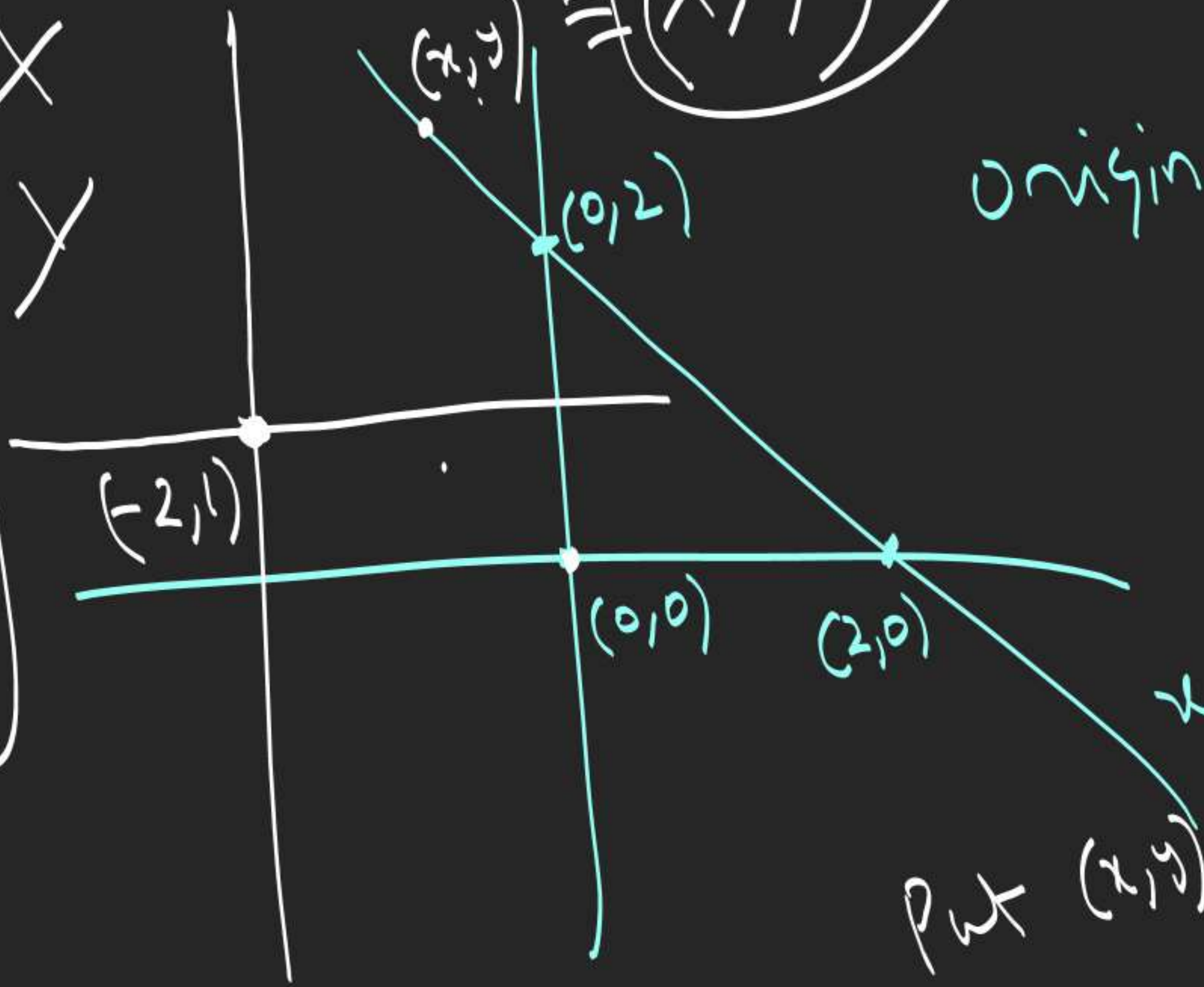
$(0,0)$

$(x,y) = (X,Y)$

$x - (-2) = X$

$y - 1 = Y$

$$\boxed{\begin{aligned} x &= X - 2 \\ y &= Y + 1 \end{aligned}}$$



origin $(-2, 1)$

$$\boxed{X + Y = 3}$$

$x + y = 2$

Put $(x,y) = (X-2, Y+1)$ to $x+y=2$

$X - 2 + Y + 1 = 2$