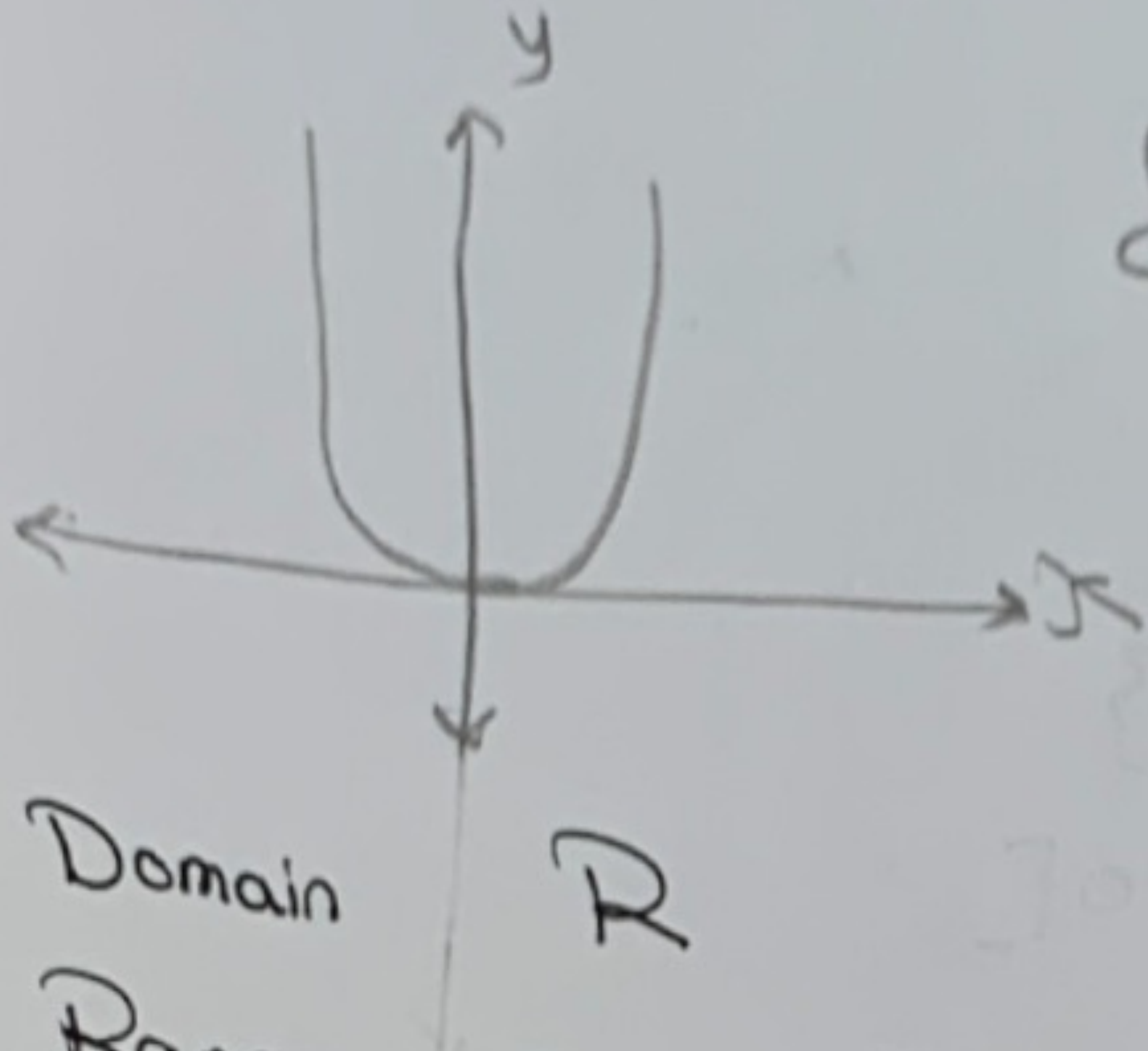
Quadratic Function

$y = (+)x^2$

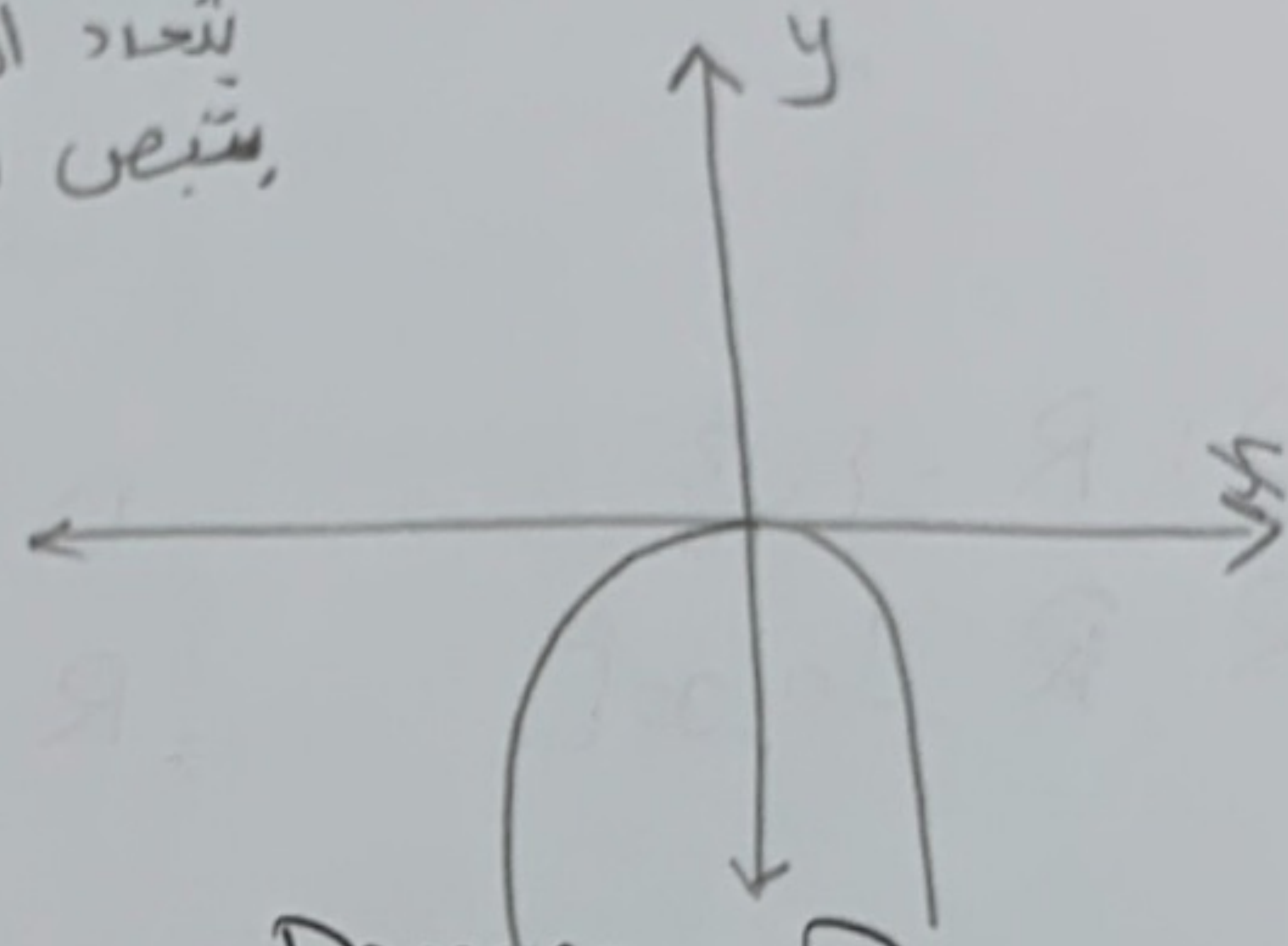


Domain R

Range $[0, \infty[$

إشارة معامل x
بتحدد الوجهة هترسم
بتبص لفوق ولا تحت

$y = (-)x^2$



Domain R

Range $]-\infty, 0]$

$$y - b = \pm K(x - a)^2$$

K → + → ∪	K → − → ∩

① $y = x^2 - 4x + 6$

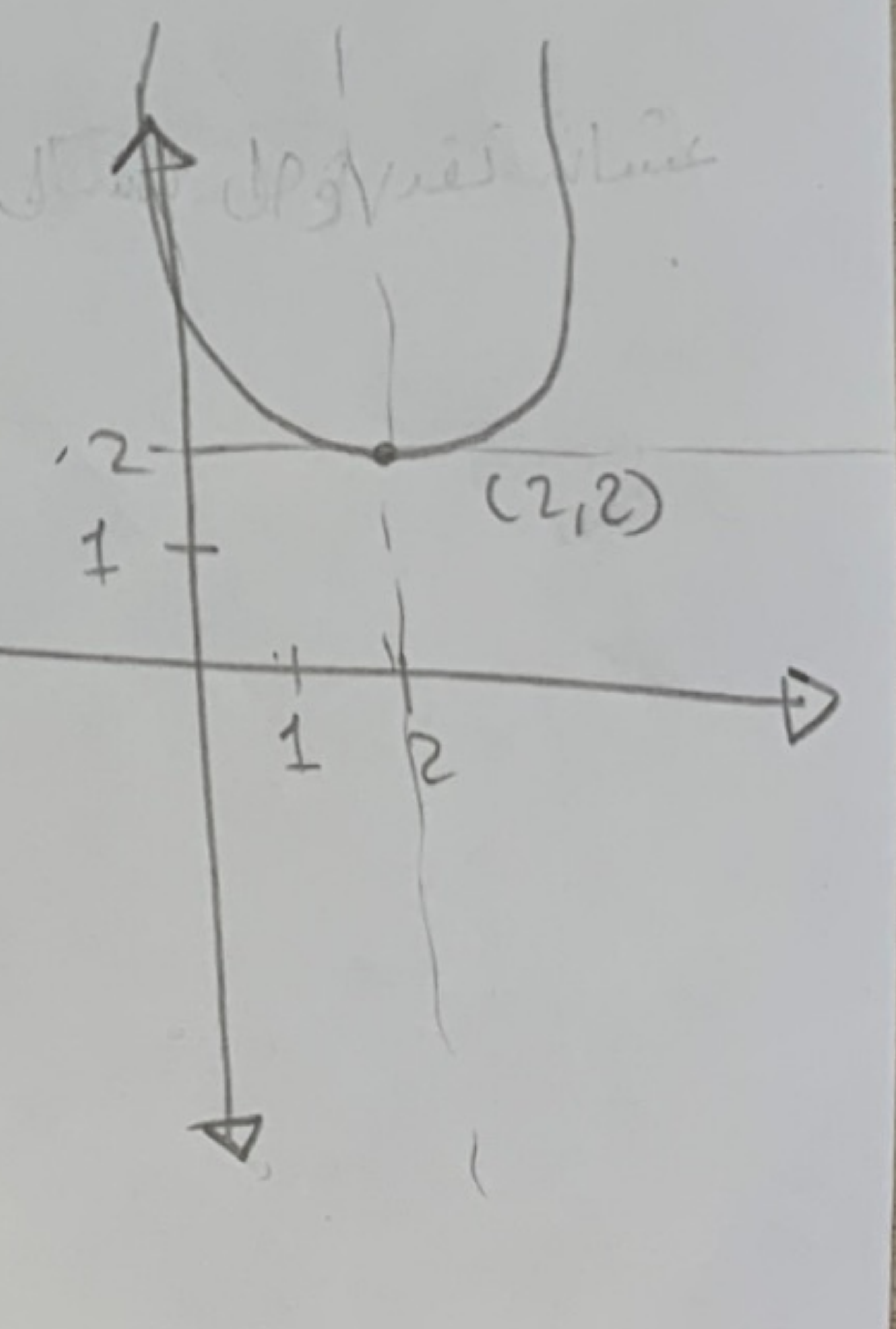
$x^2 - 4x + 6 =$

جذر → $(x-2)^2 - 4 + 6$ ← نزلناه زي ما هو بإشارته

(−4: شطفه ثانية ; −: ثابتة ; $(x-2)^2$ ← تربيع)

$y = +(x-2)^2 + 2$ [K → +ve]

$y - 2 = (x-2)^2$



$y - 2 = 0$ → $y = 2$

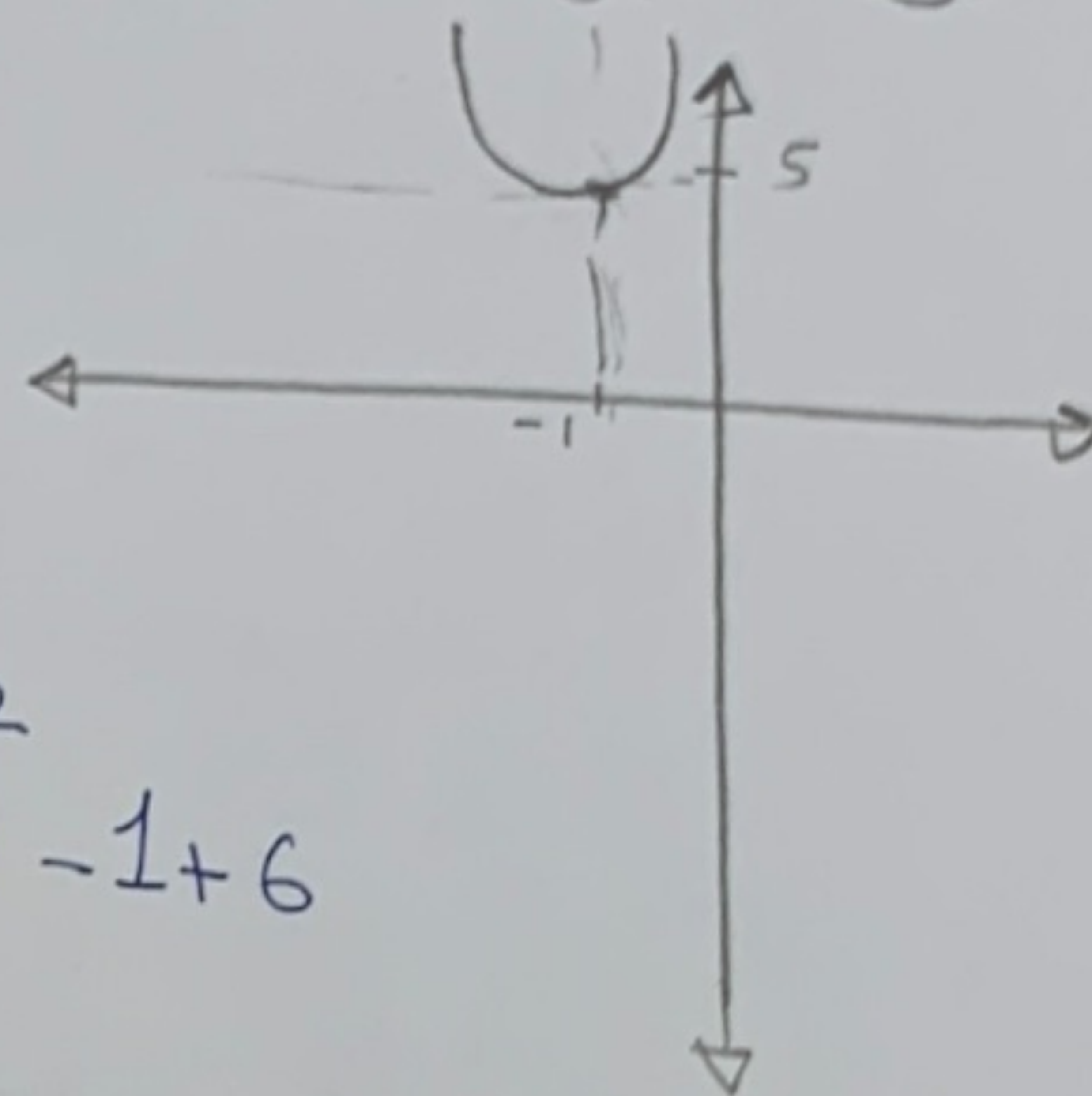
$x - 2 = 0$ → $x = 2$

Domain : R Range : $2, \infty[$

2

$y = -2x^2 - 4x - 12$

$y - b = \pm k (x - a)^2$ ← عايزين نوصل للشكل ده



$y = -2x^2 - 4x - 12$

$= -2(x^2 + 2x + 6)$

$x^2 + 2x + 6 = (x+1)^2 - 1 + 6$

$y = (x+1)^2 + 5$

$y - 5 = (x+1)^2$

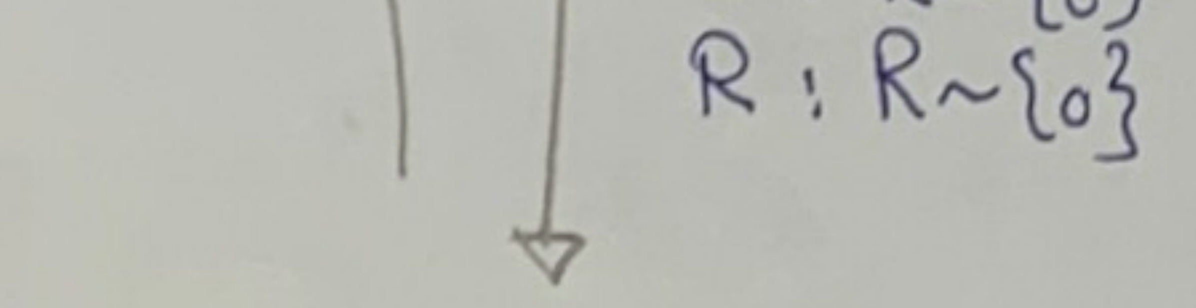
$\boxed{y = 5}$ $\quad$ $x + 1 = 0$, $\boxed{x = -1}$

$D = R$

$R: [5, \infty[$

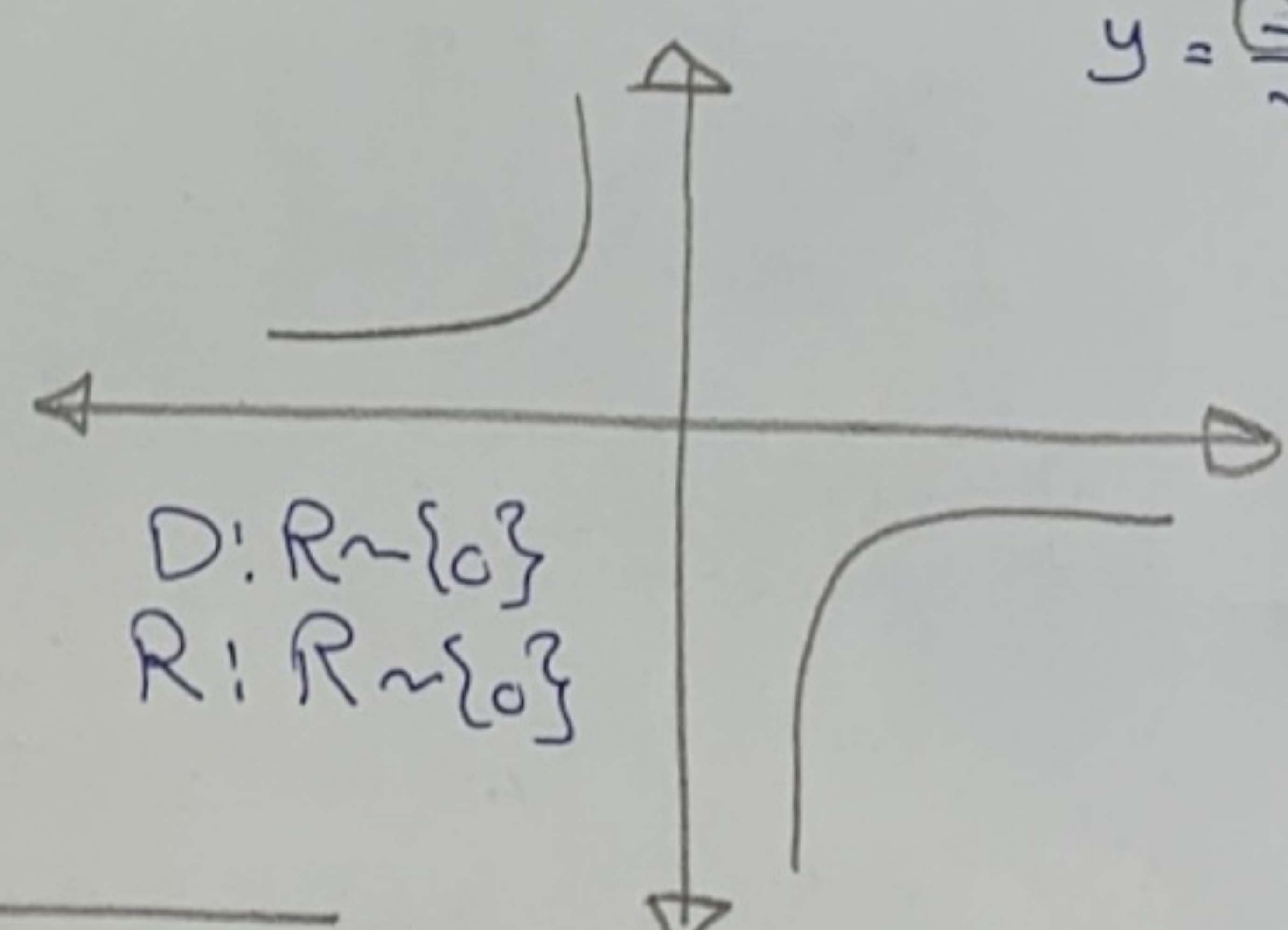
Rotional Funcions:

ابع اول وثالث $y = \frac{+1}{x}$



D: R~{0}
R: R~{0}

ابع ثاني ورابع $y = \frac{-1}{x}$



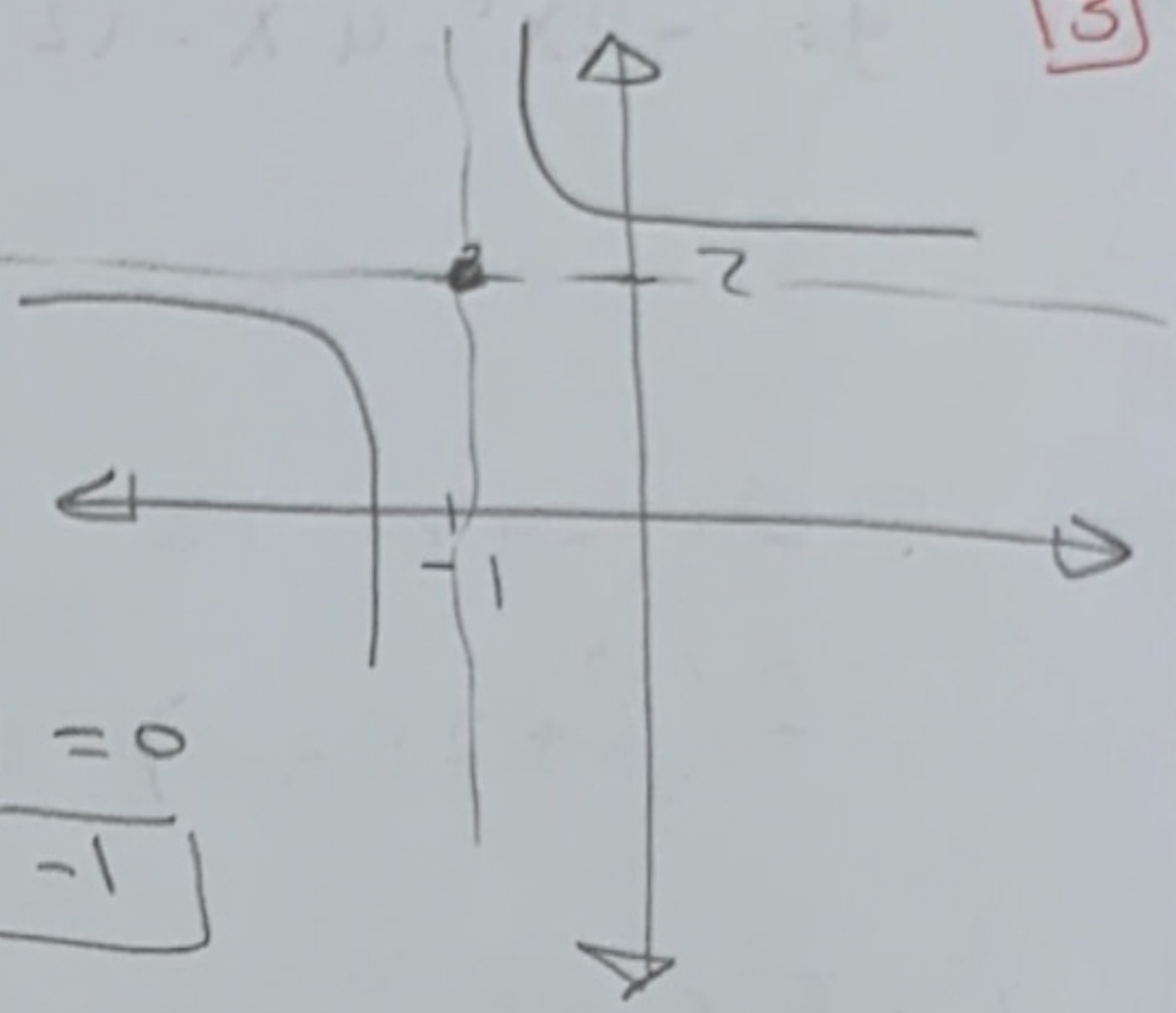
D: R~{0}
R: R~{0}

$$\boxed{y - b = \pm \frac{k}{x - a}}$$

Ex9 Sketch $y = 2 + \frac{1}{x+1}$

$y - b = \pm \frac{K}{x-a}$

$y - 2 = \frac{1}{x+1}$



$y - 2 = 0$

$\boxed{y = 2}$

$x + 1 = 0$

$\boxed{x = -1}$

$(-1, 2)$

$K \longrightarrow +ve$

D : $R - \{-1\}$

R : $R - \{2\}$

Ex10

$y = \frac{x+3}{x+2} \longrightarrow 1+2$

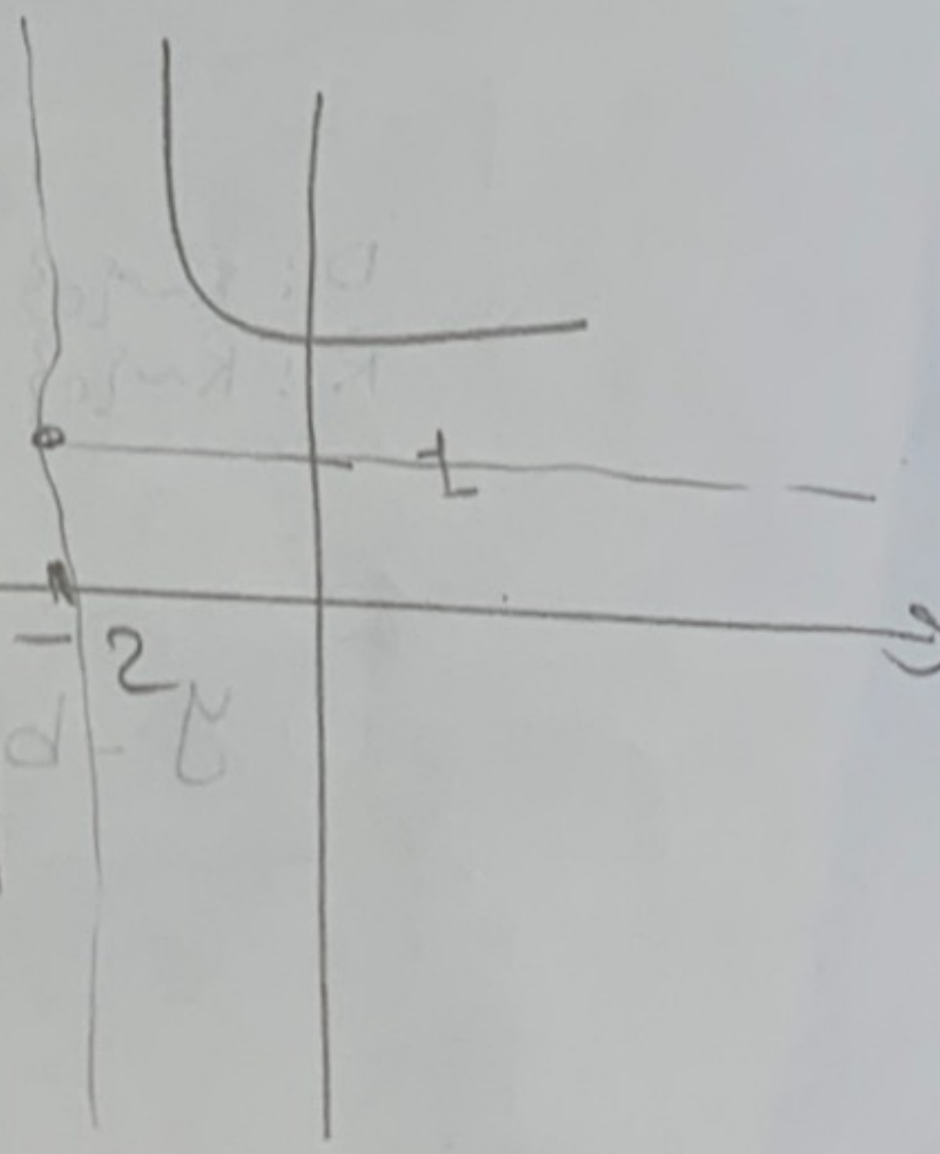
$y - b = \pm \frac{K}{x-a}$

$y = \frac{x+2+1}{x+2} = \frac{x+2}{x+2} + \frac{1}{x+2}$

هنوع البسط

$y = 1 + \frac{1}{x+2}$

$y - 1 = \frac{1}{x+2}$



$y - 1 = 0$

$\boxed{y = 1}$

$x + 2 = 0$

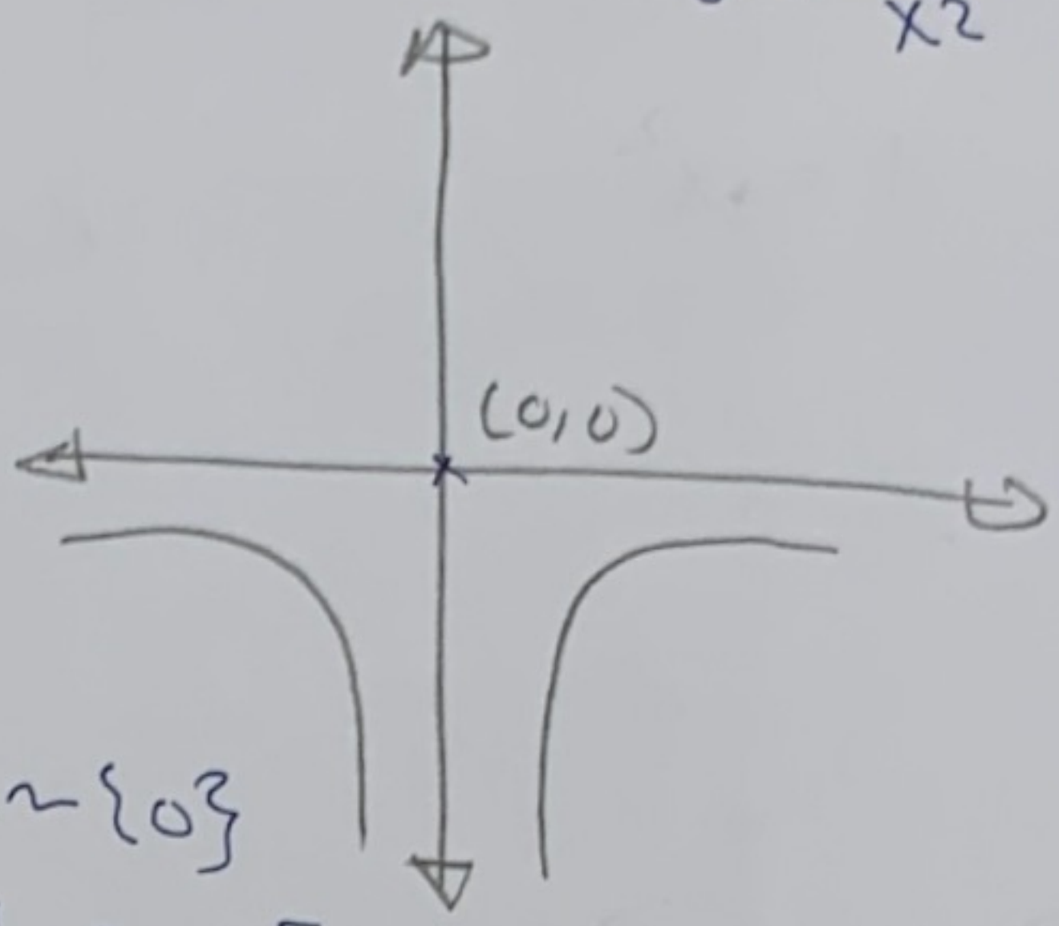
$\boxed{x = -2}$

$K \longrightarrow +ve$

4

ربع ثالث ورابع

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

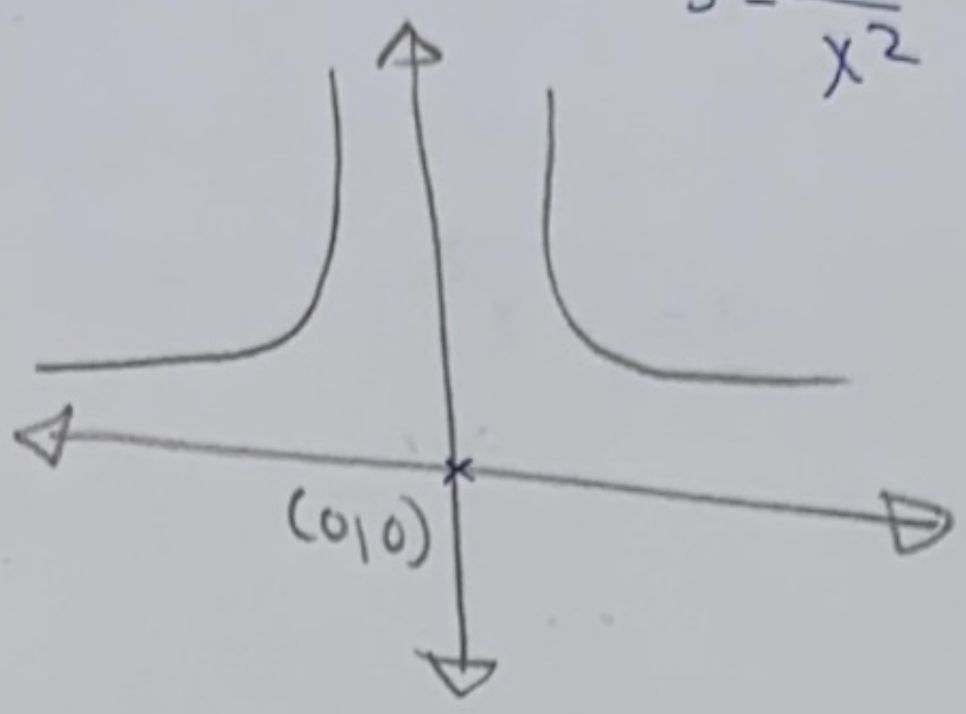


D: $\mathbb{R} - \{0\}$

R: $]-\infty, 0[$

ربع أول وثاني

$y = \frac{+1}{x^2}$



D: $\mathbb{R} - \{0\}$

R: $]0, \infty[$

$$y - b = \pm \frac{k}{(x-a)^2}$$

Exo

$$y = 2 + \frac{3}{(x-1)^2}$$

$$y - b = \pm \frac{k}{(x-a)^2}$$

$$y - 2 = \frac{3}{(x-1)^2}$$

$y - 2 = 0$

$y = 2$

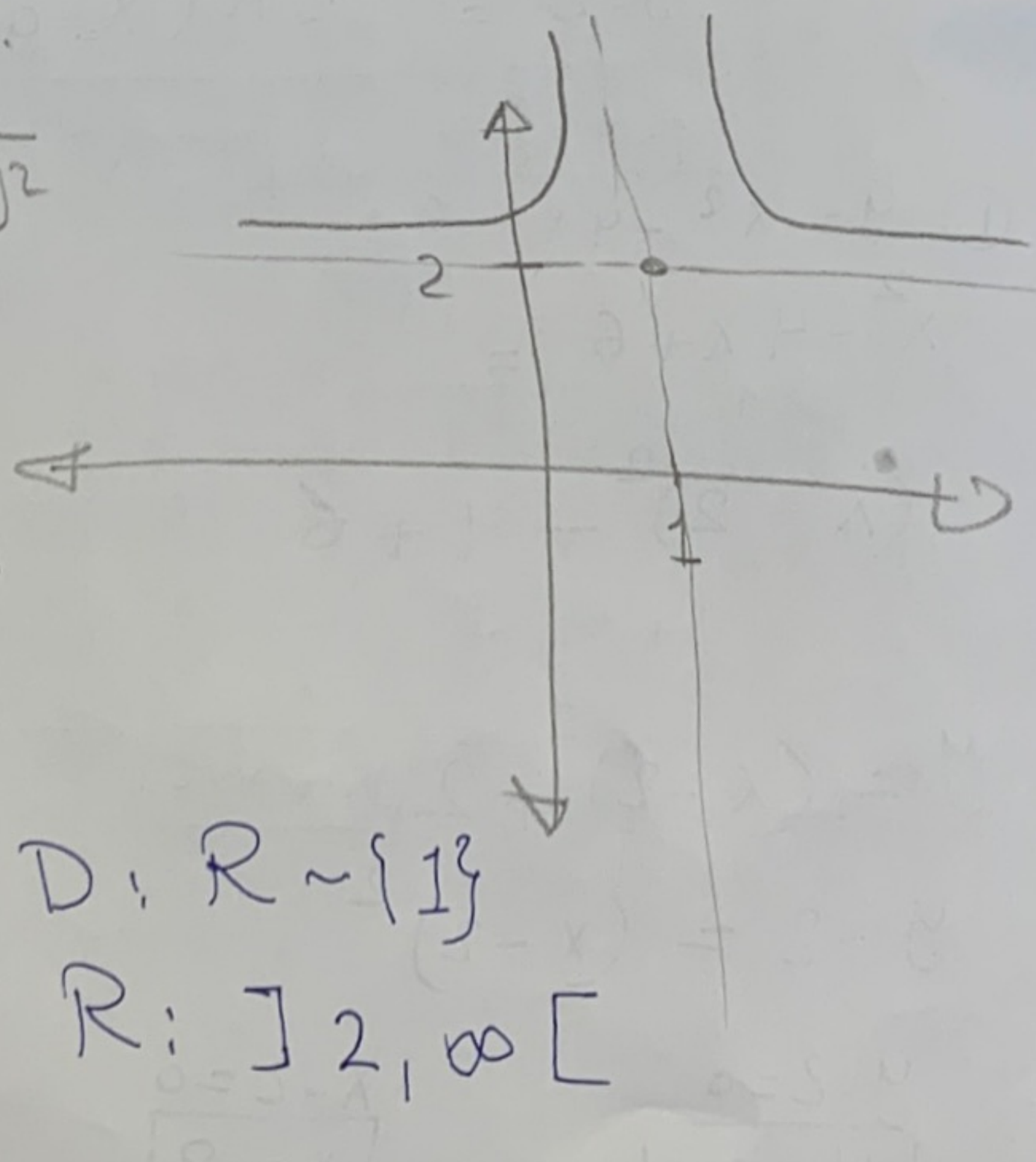
$x - 1 = 0$

$x = 1$

(1, 2)

K → +Ve

ربع أول وثاني



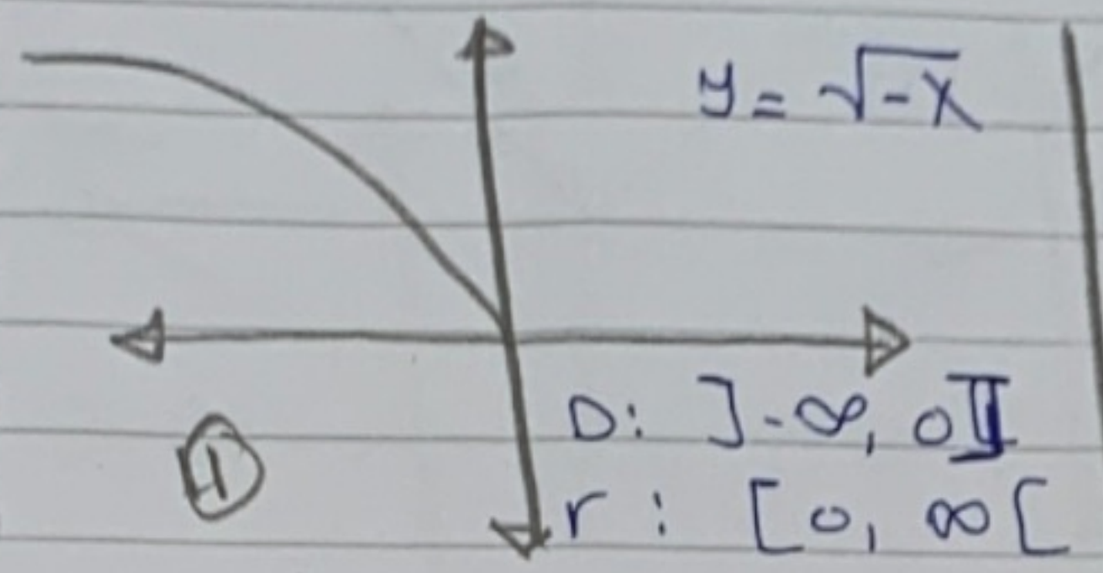
D: $\mathbb{R} - \{1\}$

R: $]2, \infty[$

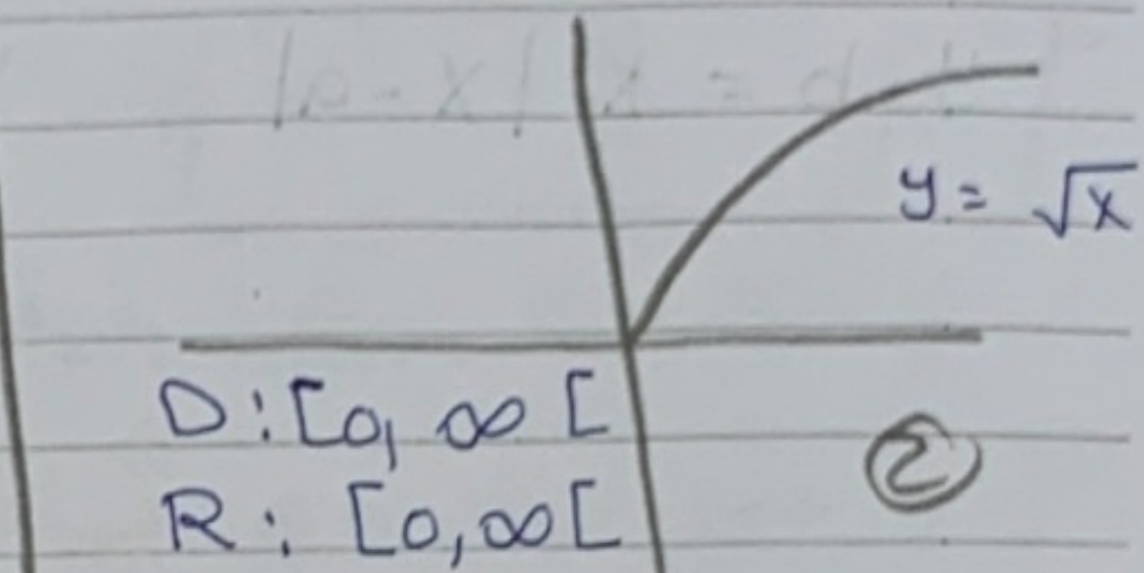
التاريخ: / /

الموضوع: _____

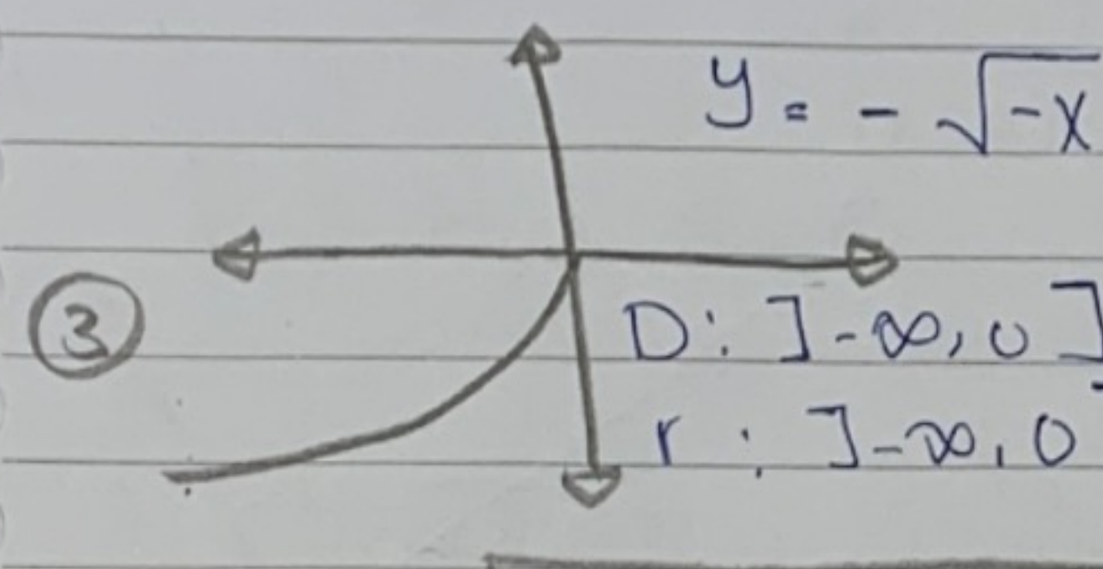
Root Function



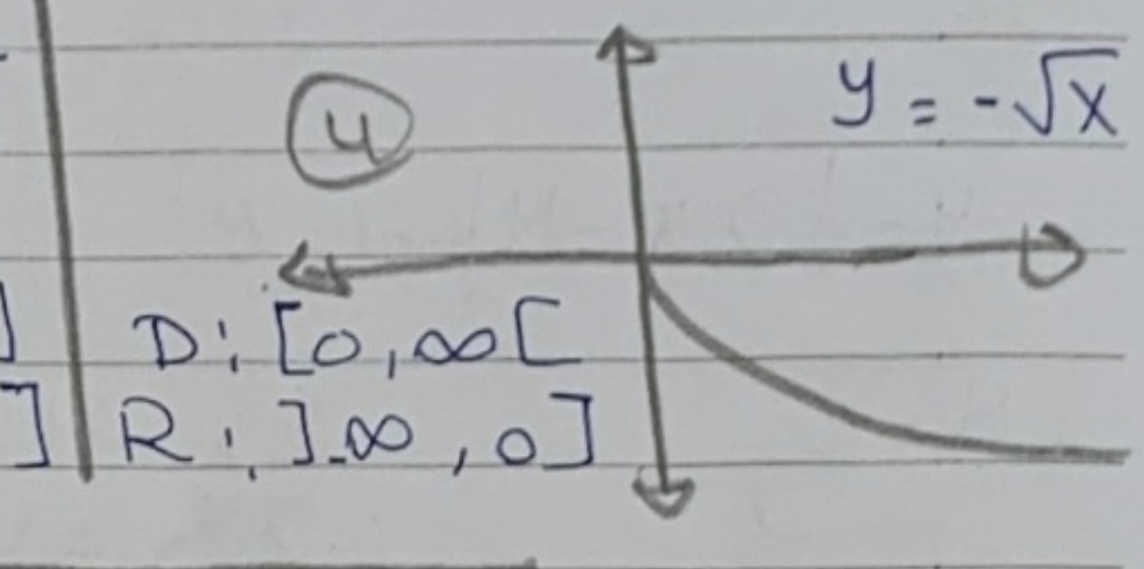
①



②



③



④

$$y - b = \pm\sqrt{x - a}$$ ← للرسمة ④, ②

$$y - b = \pm\sqrt{a - x}$$ ← للرسمة ③, ①

Ex: $y = \sqrt{2x + 6}$ $\quad y - b = \pm\sqrt{x - a}$

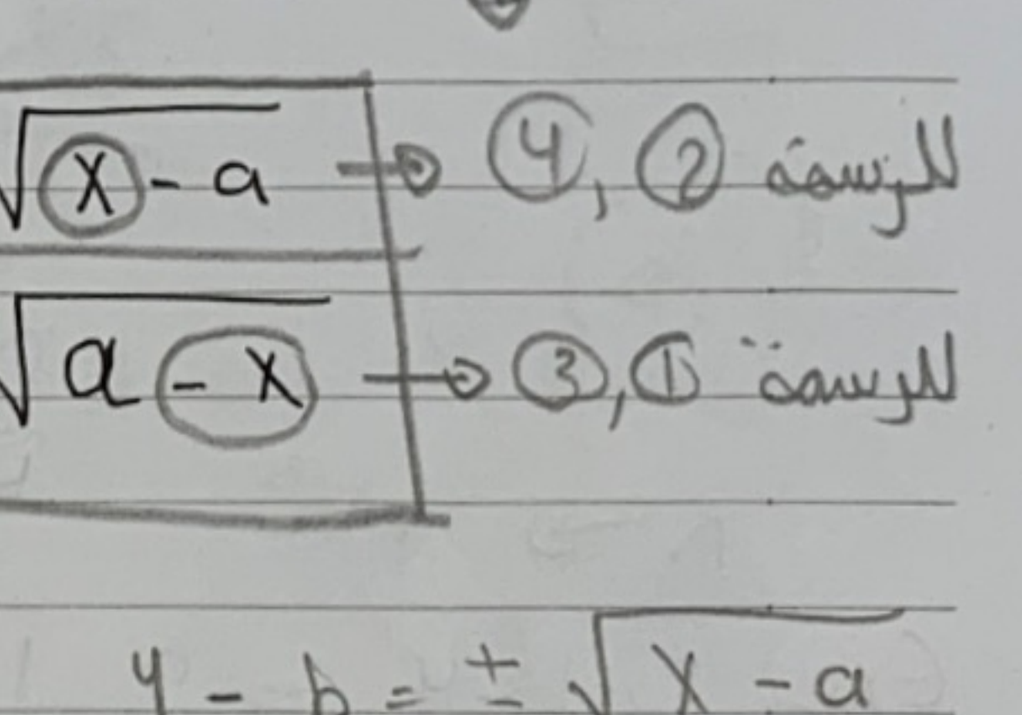
$y = 0$

$2x + 6 = 0$

$2x = -6$

$x = -3$

$(-3, 0)$



يمين

$x \rightarrow +ve \rightarrow$ موجب

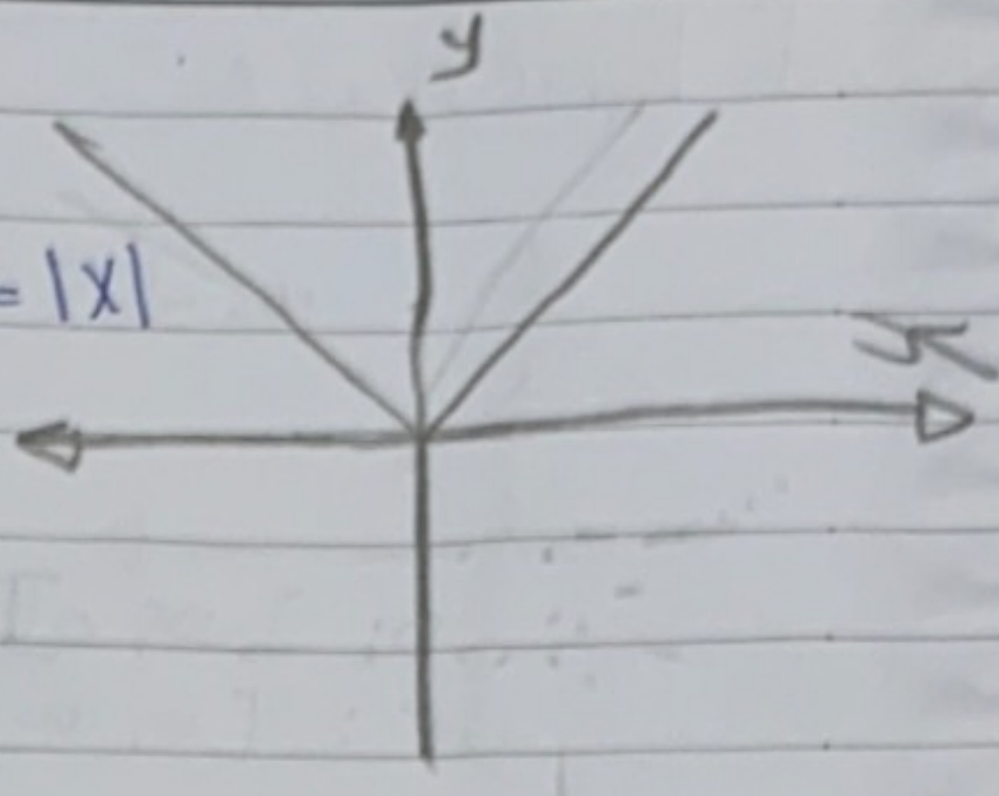
$equation \rightarrow +ve \rightarrow$ موجب

الموضوع: _____ التاريخ: / /

absolute Function:

$$y - b = k\,|x - a|$$

$y = |x|$



$k \rightarrow$ +ve $\rightarrow$ فوق

$k \rightarrow$ -ve $\rightarrow$ تحت

Ex1

$y = |2x - 4|$

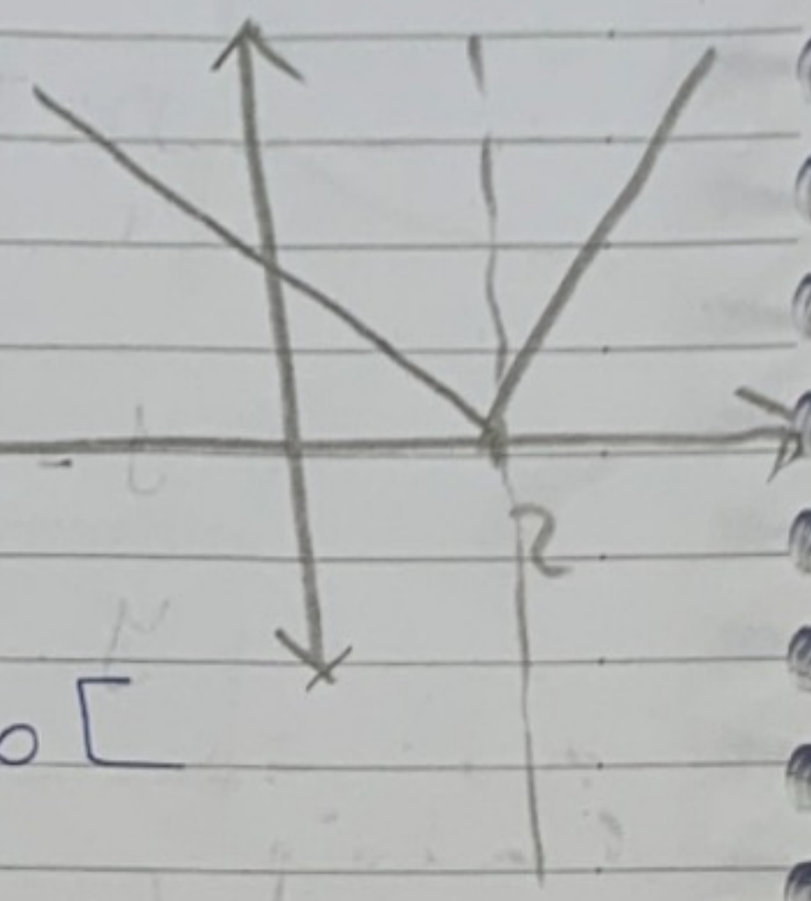
$y = 0$

$2x - 4 = 0$

$2x = 4$

$x = 2$

$(2, 0)$



D : R

R : $[0, \infty[$

$k \rightarrow$ +ve

Ex2 $1 - y = 2\,|x - 3|$

$y - b = k\,|x - a|$

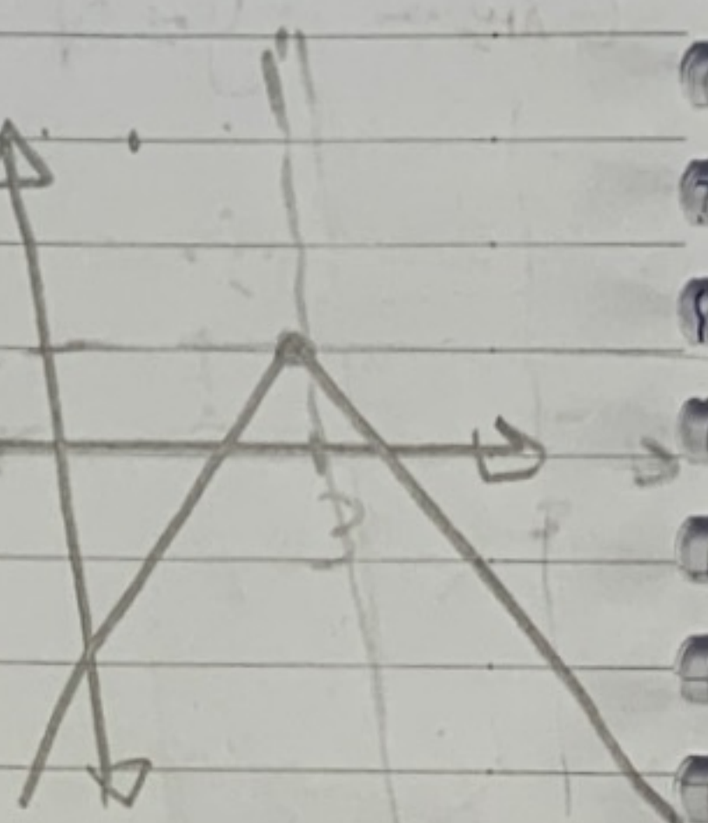
$y - 1 = -2\,|x - 3|$

$y - 1 = 0$

$y = 1$

$x - 3 = 0$

$x = 3$



$k \rightarrow$ -ve

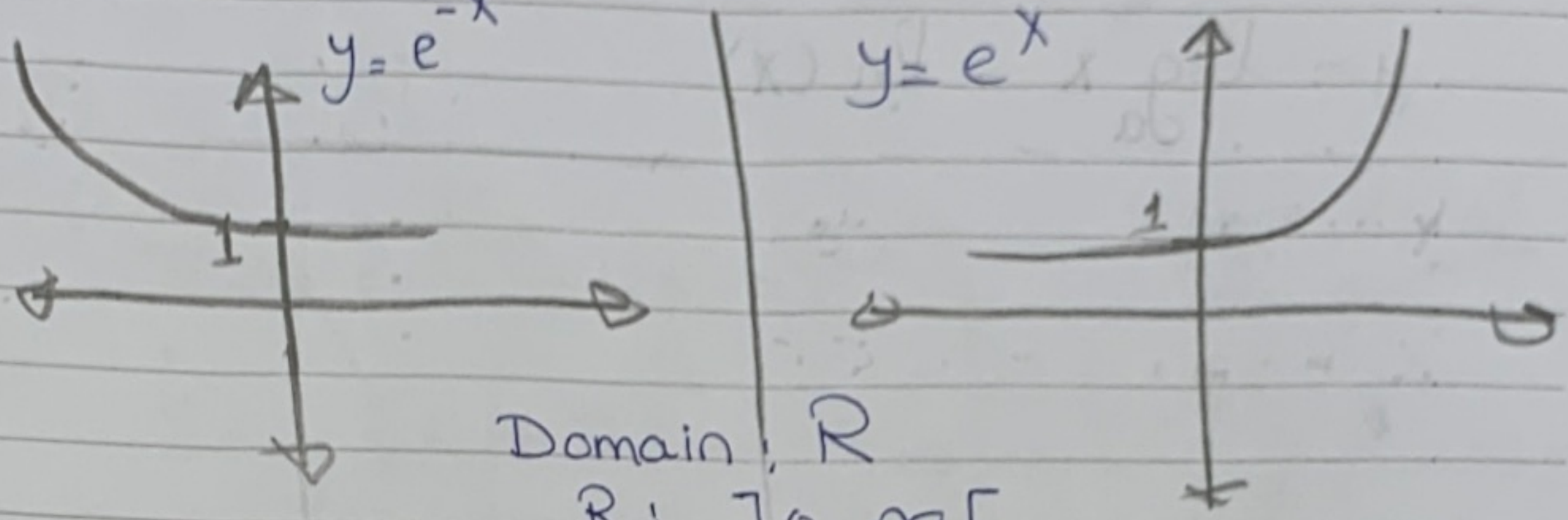
D : R

R : $]-\infty, 1]$

التاريخ: / /

الموضوع: _____

*Exponatical Function :-



Domain : R

R : $]0, \infty[$

$$y - b = K\, e^{(x-a)} \qquad y - b = K\, e^{-(x-a)}$$

K ⇝ Shift

Ex :- $y + 1 = 3e^{4-x}$

$$y - b = K\, e^{-(x-a)}$$

$y + 1 = 0$

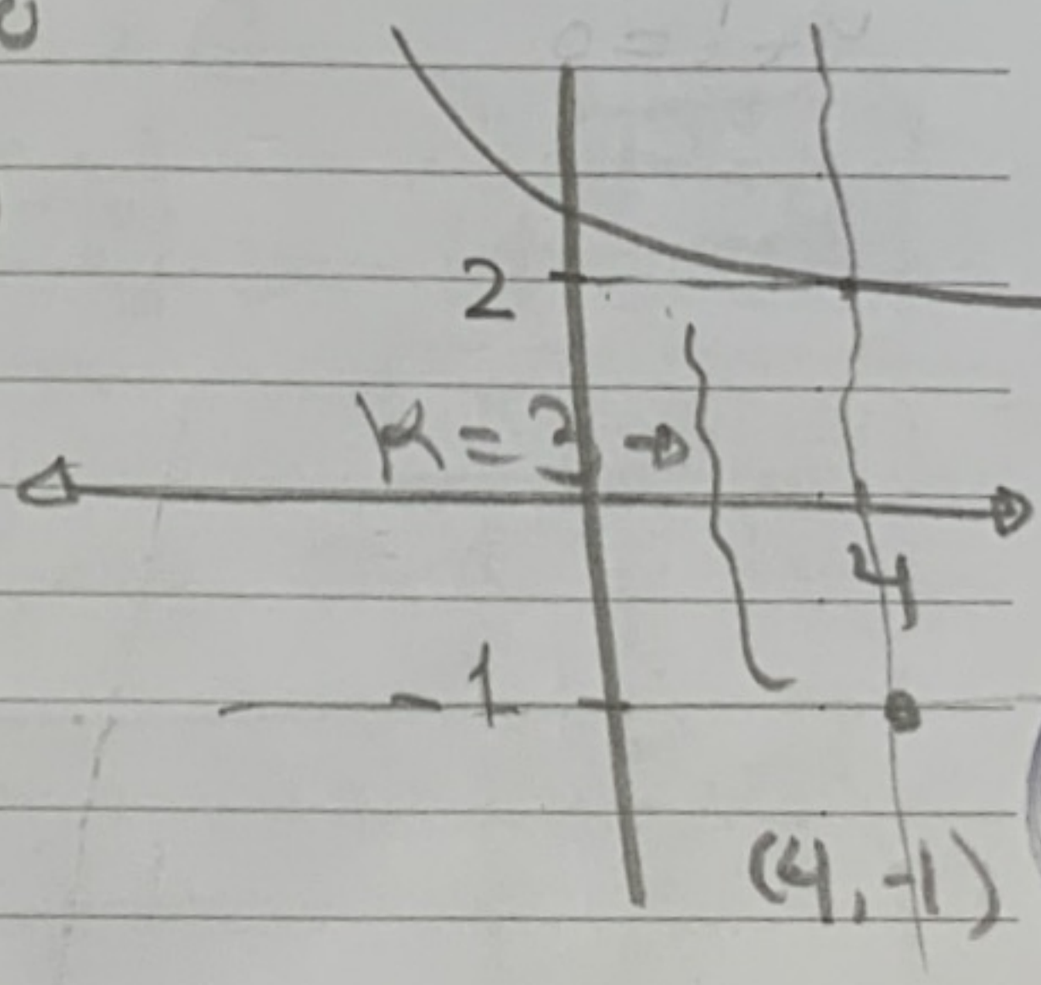
$\boxed{y = -1}$

$4 - x = 0$

$\boxed{x = 4}$

New orgin $(4, -1)$

K = 3 ⇝ Shift لفوق



D : R

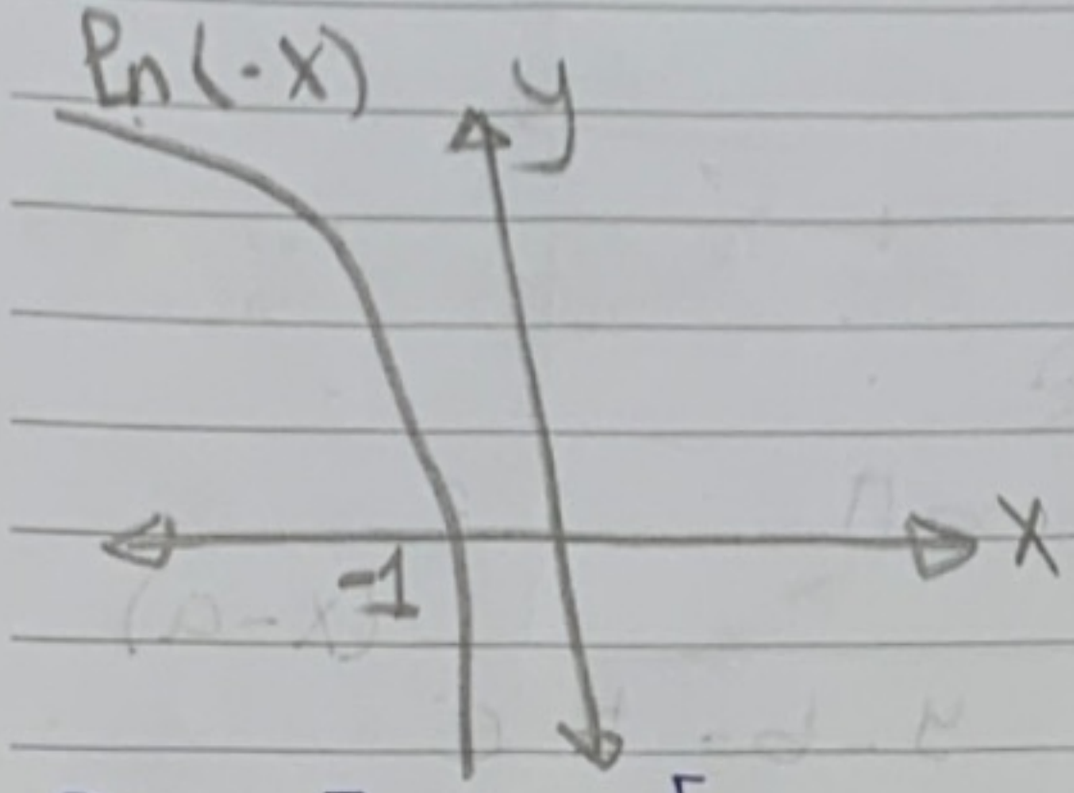
R : $]-1, \infty[$

التاريخ: / /

الموضوع:

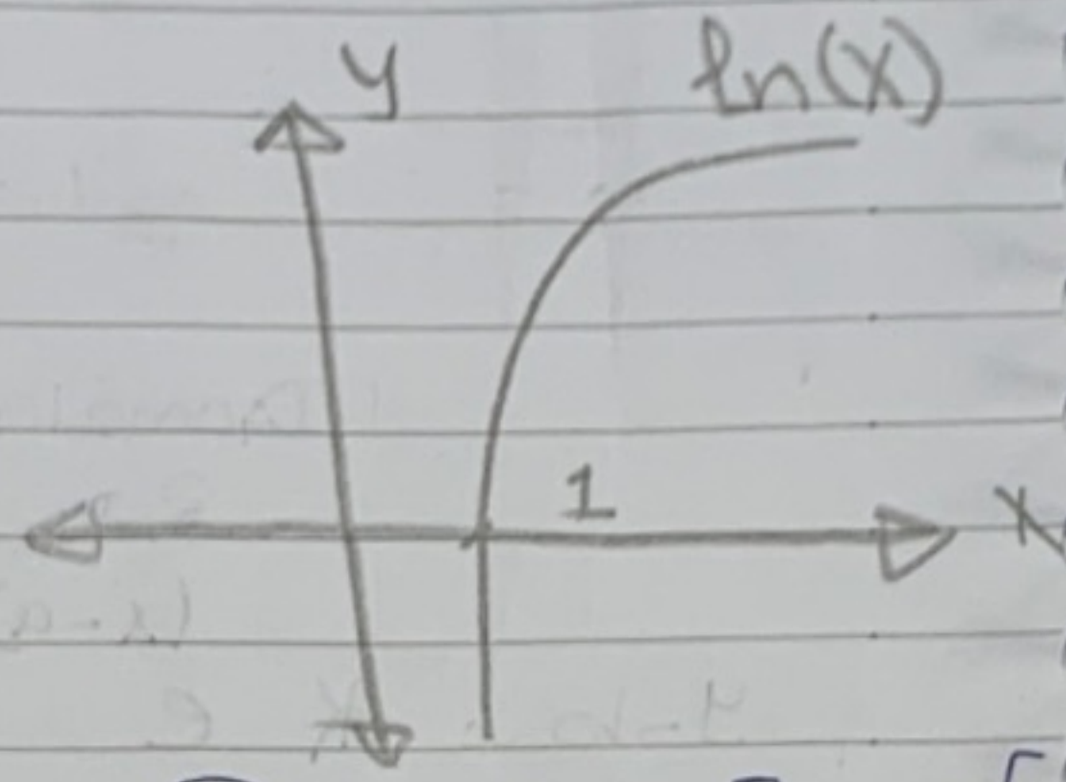
Logarithmic Function

$$y = \log_a x = \ln(x)$$



D: $]-\infty, 0[$

R: R



Domain $]0, \infty[$

R: R

$$\boxed{y = \ln(ax)}$$

Ex9

$$y + 1 = 3\ln(2x - 4)$$

عشان اجيب نقطة التقاطع مع x-axis بجيب مقلوب

$y + 1 = 0$

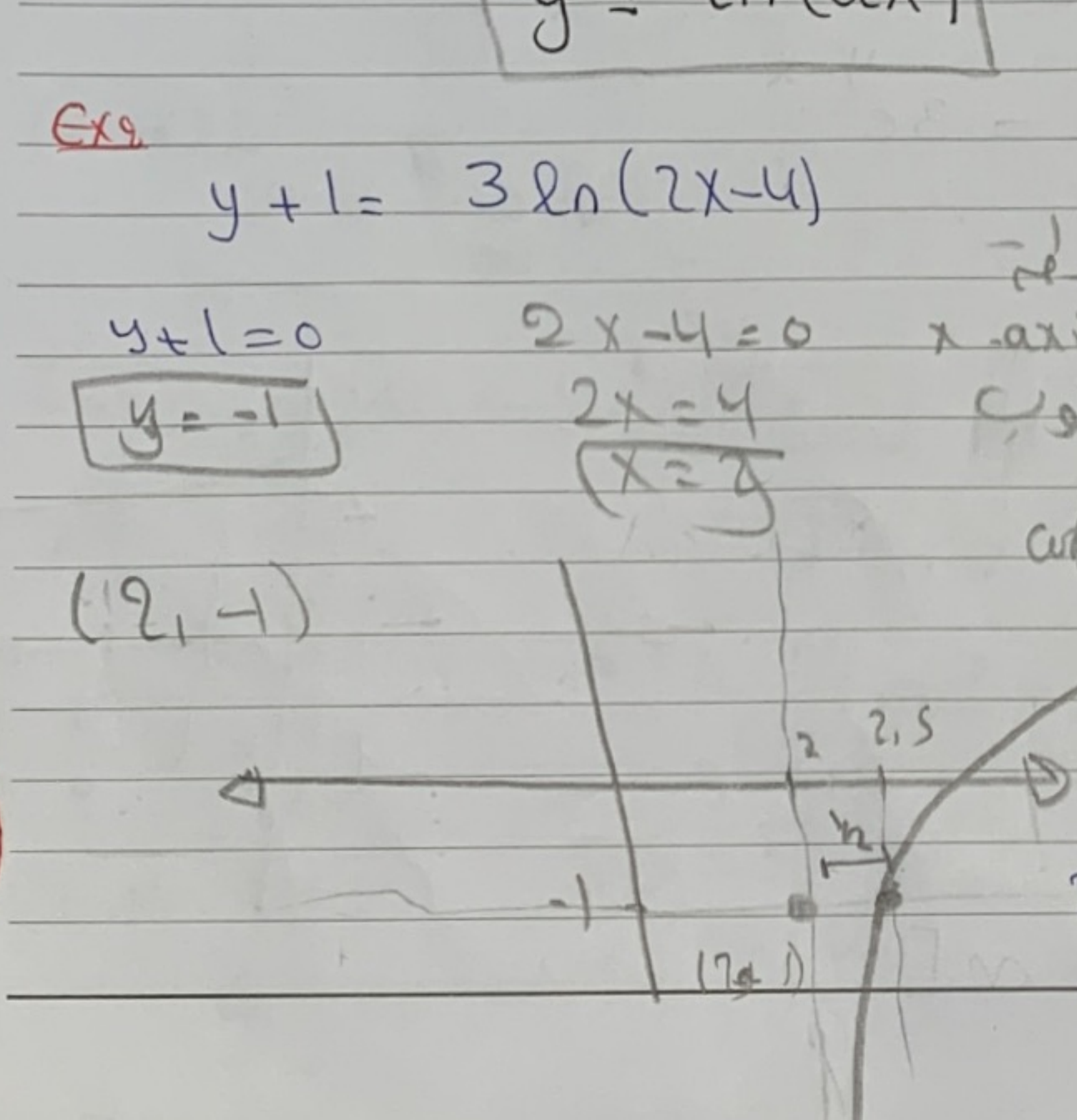
$\boxed{y = -1}$

$2x - 4 = 0$

$2x = 4$

$\boxed{x = 2}$

$\text{asymptote} = \frac{1}{2}$



D: $]2, \infty[$

R: R

التاريخ: / / الموضوع: _____

Sheet (2)

[1] Sketch & find the domain & Range.

① $y = x^2 + 4x$

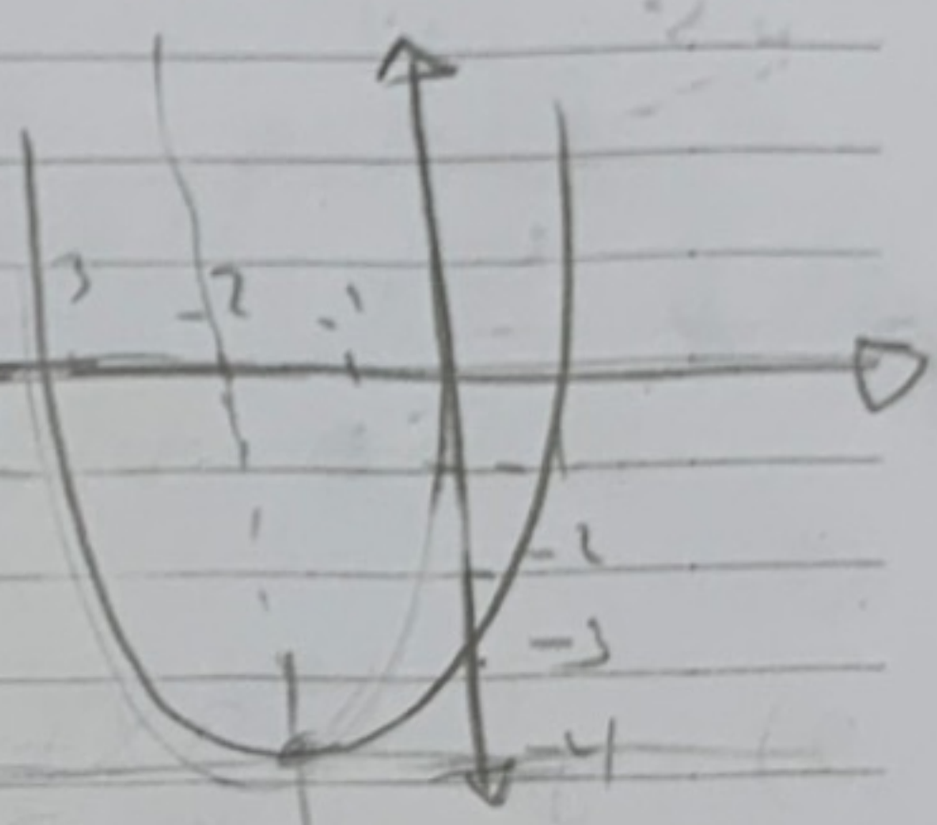
$y - b = \pm k(x-a)^2$

$y = (x+2)^2 - 4$

$y + 4 = (x+2)^2$

$\boxed{y = -4}$ $\boxed{x = -2}$

$(-2, -4)$ $k \to 0$ +Ve



Domain : $\mathbb{R}$
Range : $[-4, \infty[$

② $y = 6x - 10 - x^2 = -x^2 + 6x - 10$

$= -(x^2 - 6x + 10)$

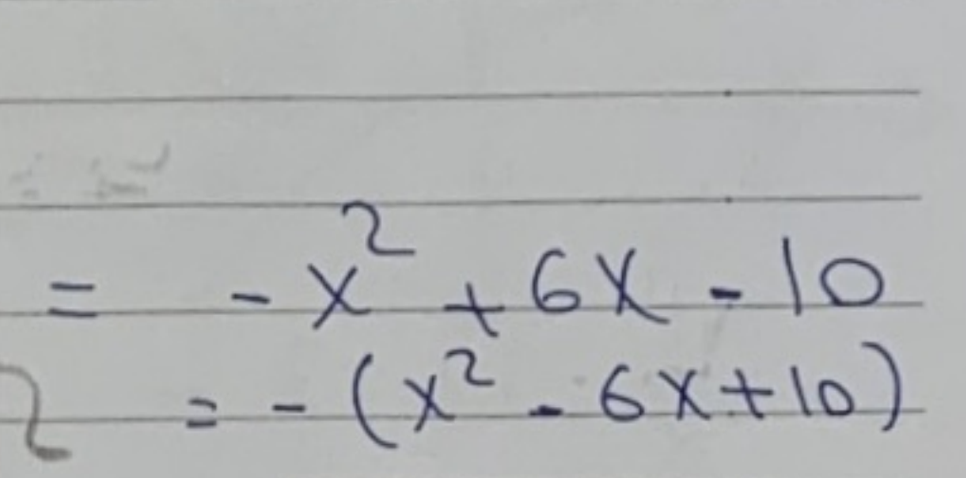
$y - b = \pm k(x-a)^2$

$\boxed{k \to 0 \text{ -ve}}$

$y = -(x-3)^2 + 1$

$y + 1 = -(x-3)^2$

$\boxed{y = -1}$ $\boxed{x = 3}$

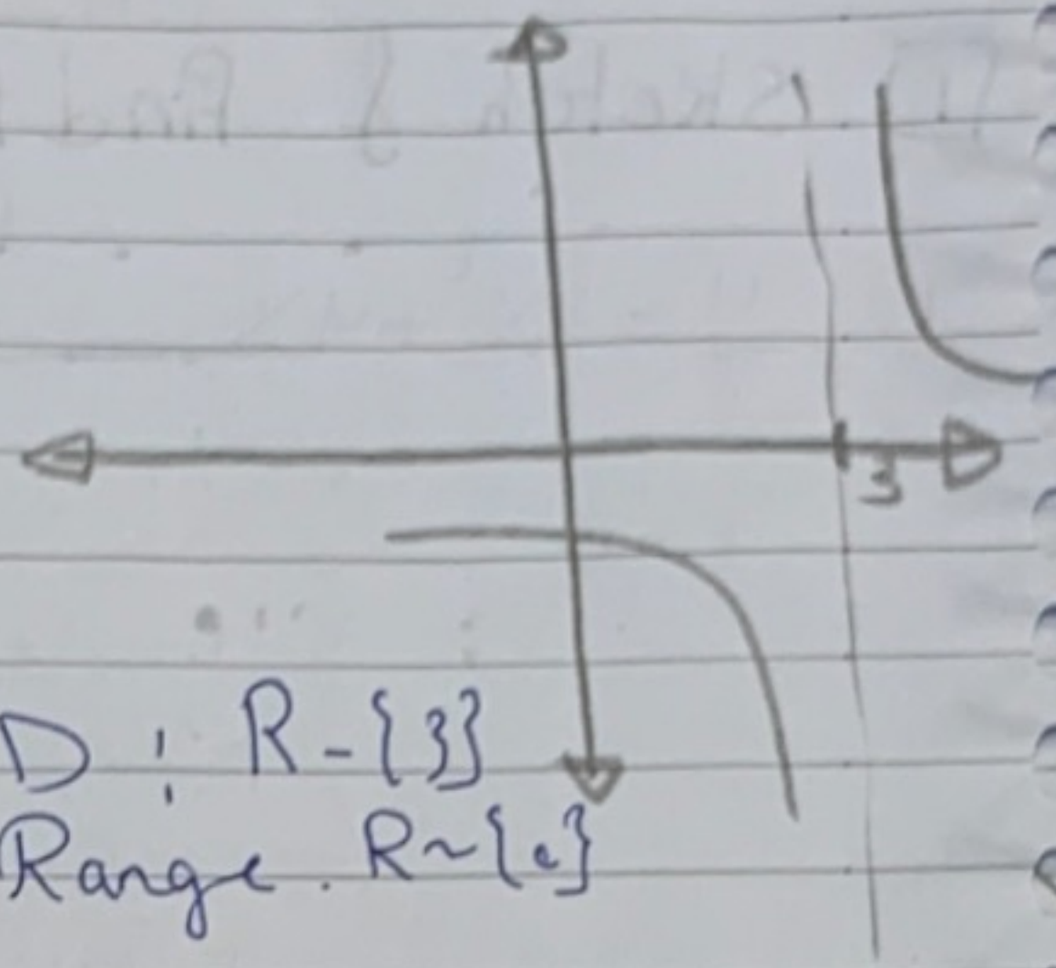


B 1) $y = \frac{4}{x-3}$

$y - b = \frac{\pm K}{x - a}$

$y = 0$ $x = 3$

$K \rightarrow +ve$



D : $R - \{3\}$

Range $R - \{0\}$

2) $y = \frac{3x+6+3-3}{x+3}$ $y - b = \frac{\pm K}{x-a}$

$y = \frac{3x+9-3}{x+3} = \frac{3(x+3)-3}{x+3}$

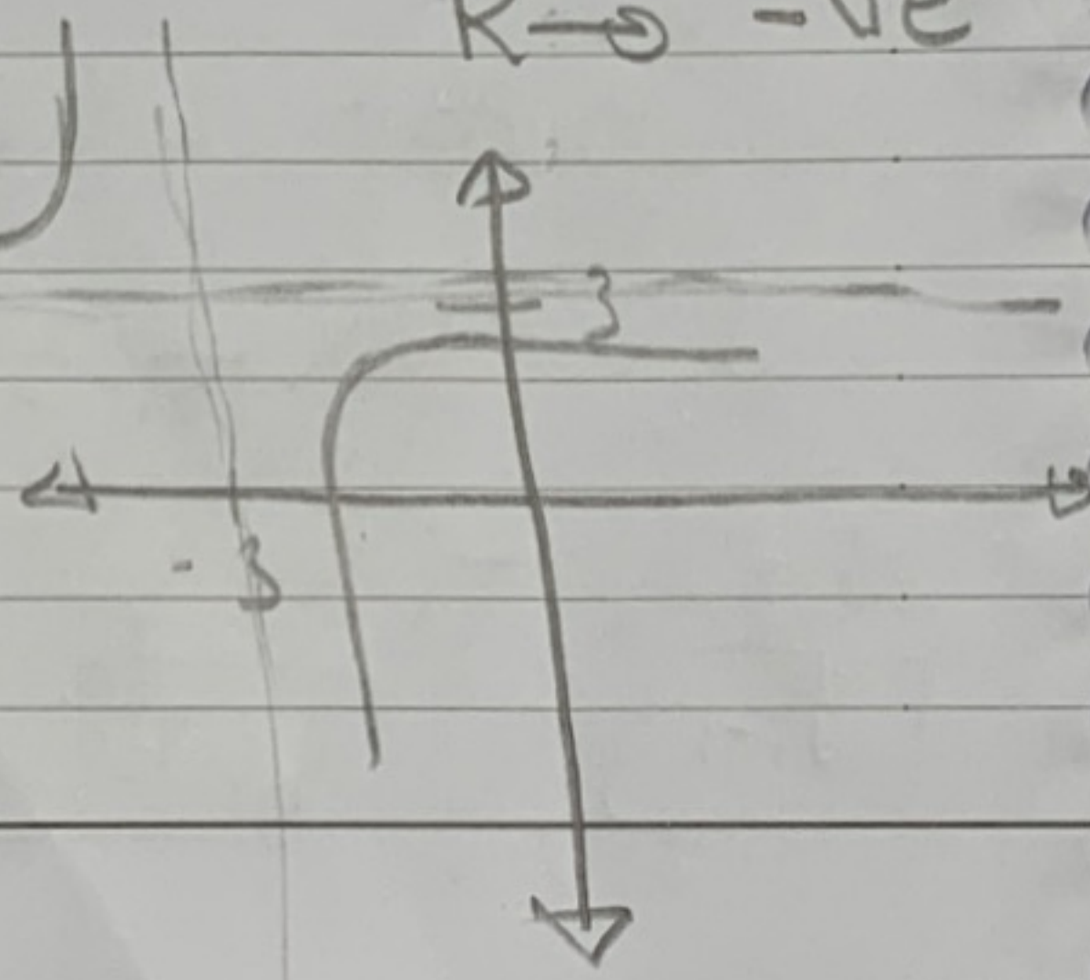
$y = \frac{3(x+3)}{x+3} - \frac{3}{x+3}$

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

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

$y = 3$ $x = -3$

$K \rightarrow -ve$



D : $R - \{-3\}$

Rang $R - \{3\}$