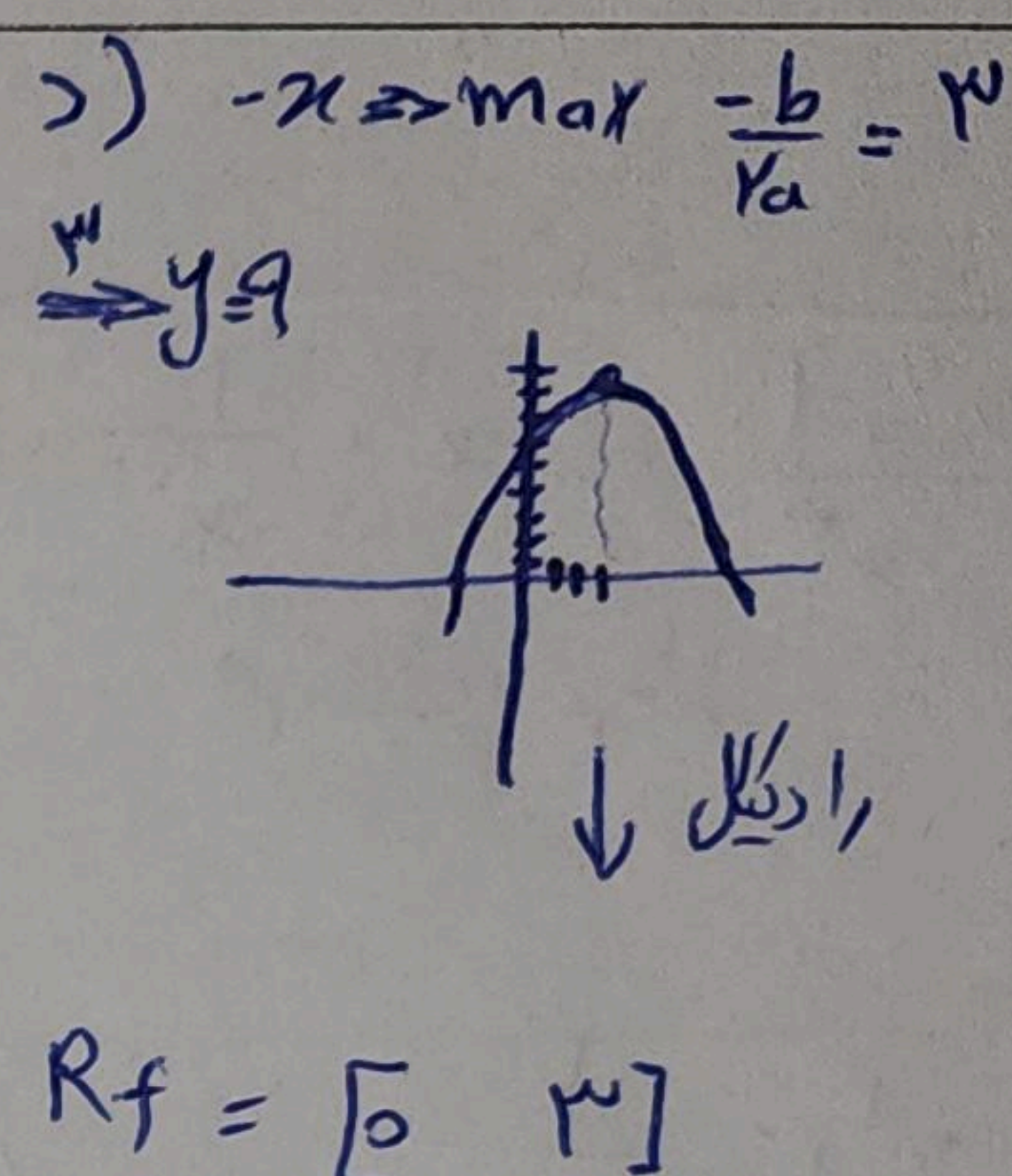
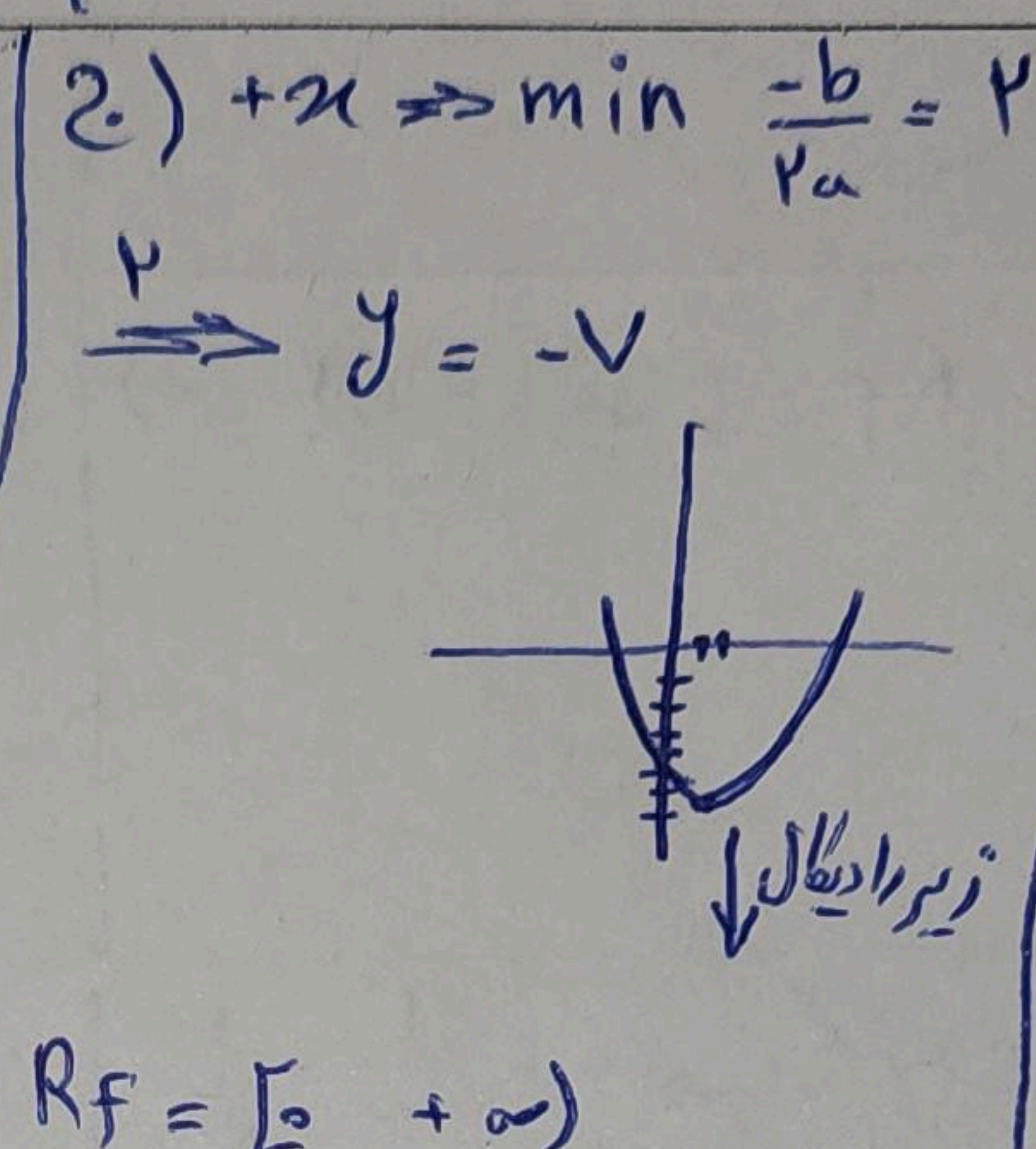
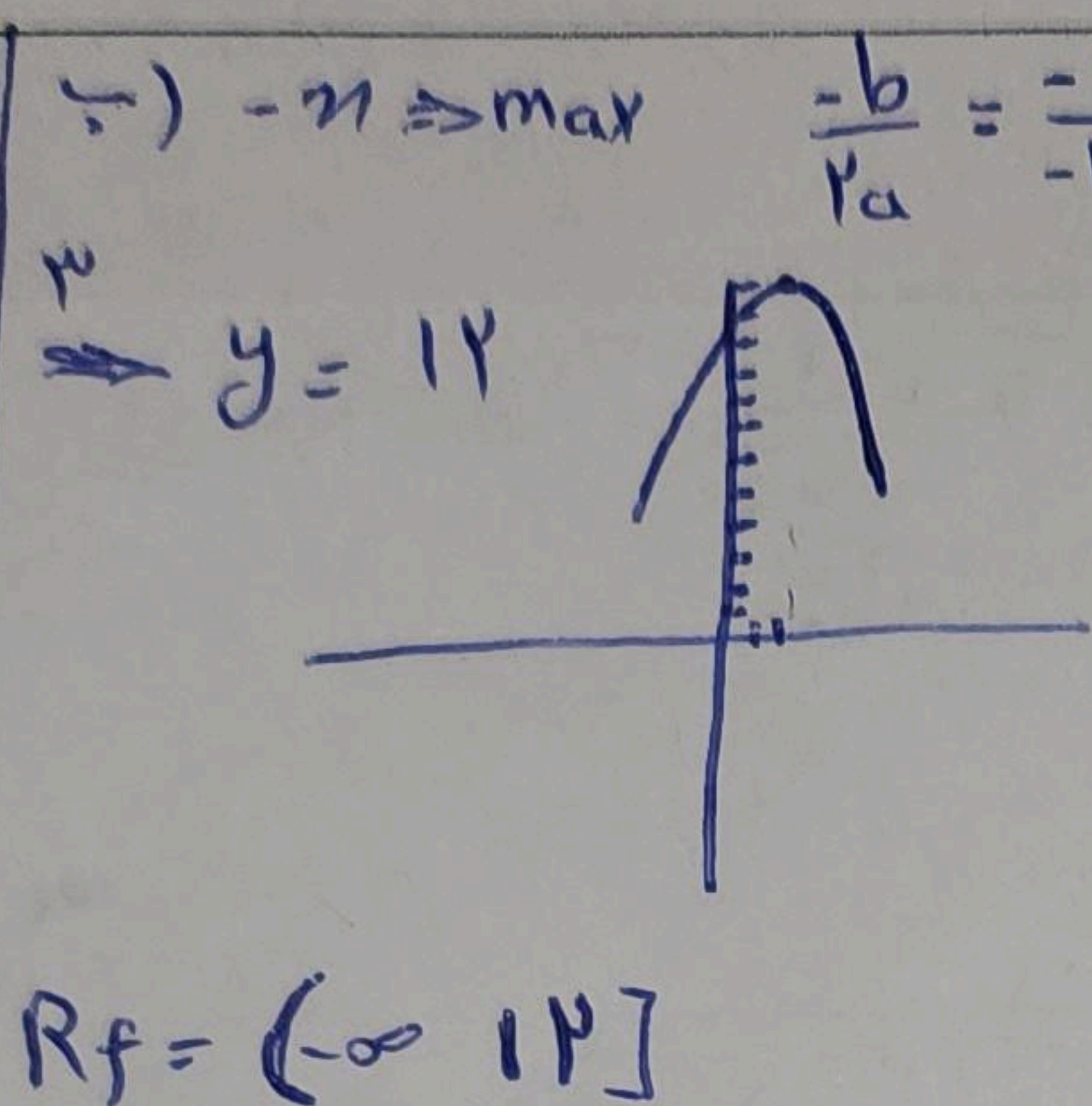
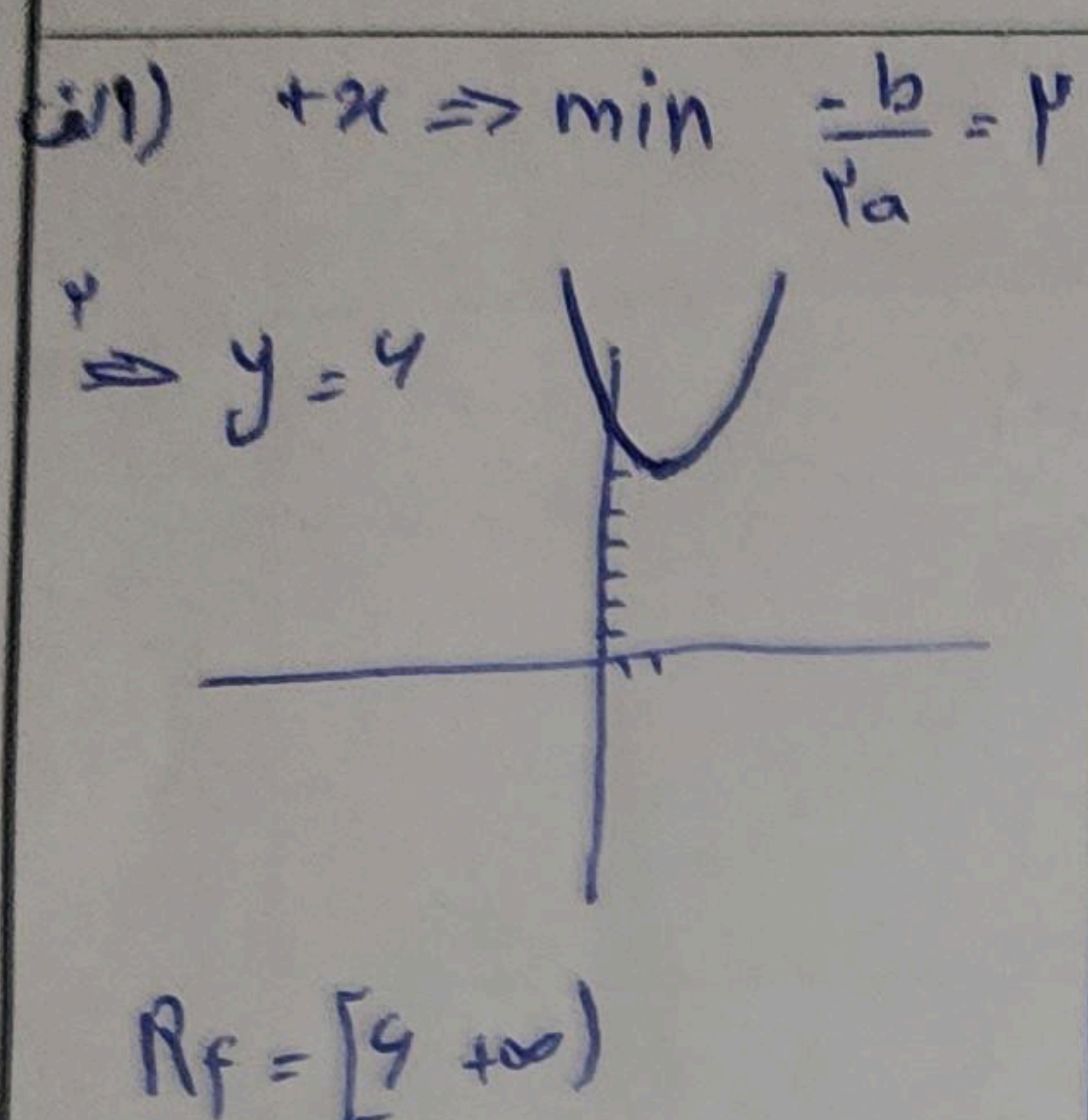


الف) $x^3 - 3x^2 + 3x \rightarrow (x-1)^3 + 1 = y$
 $\sqrt[3]{} \rightarrow x-1 = \sqrt[3]{y-1} \Rightarrow x = \sqrt[3]{y-1} + 1$
 $R_f = \mathbb{R}$

ب) $y = \frac{1}{x^2 - 2x} \Rightarrow y = \frac{1}{(x-1)^2 - 1}$
 $\frac{1}{y} = (x-1)^2 - 1$
 $x = \pm \sqrt{\frac{1}{y} + 1} + 1 \quad y \neq (-1, 0]$
 $R_f = \mathbb{R} - (-1, 0]$

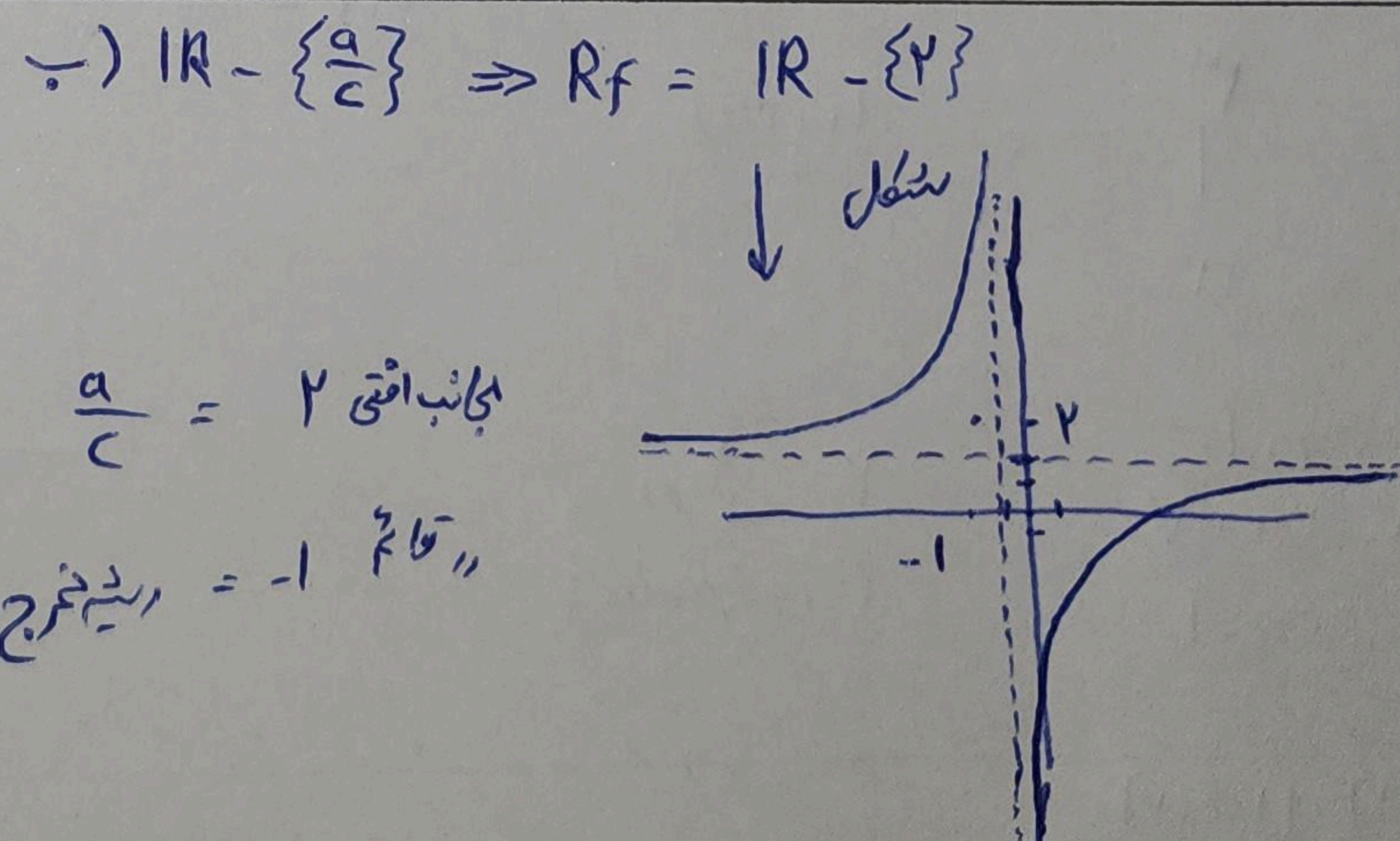
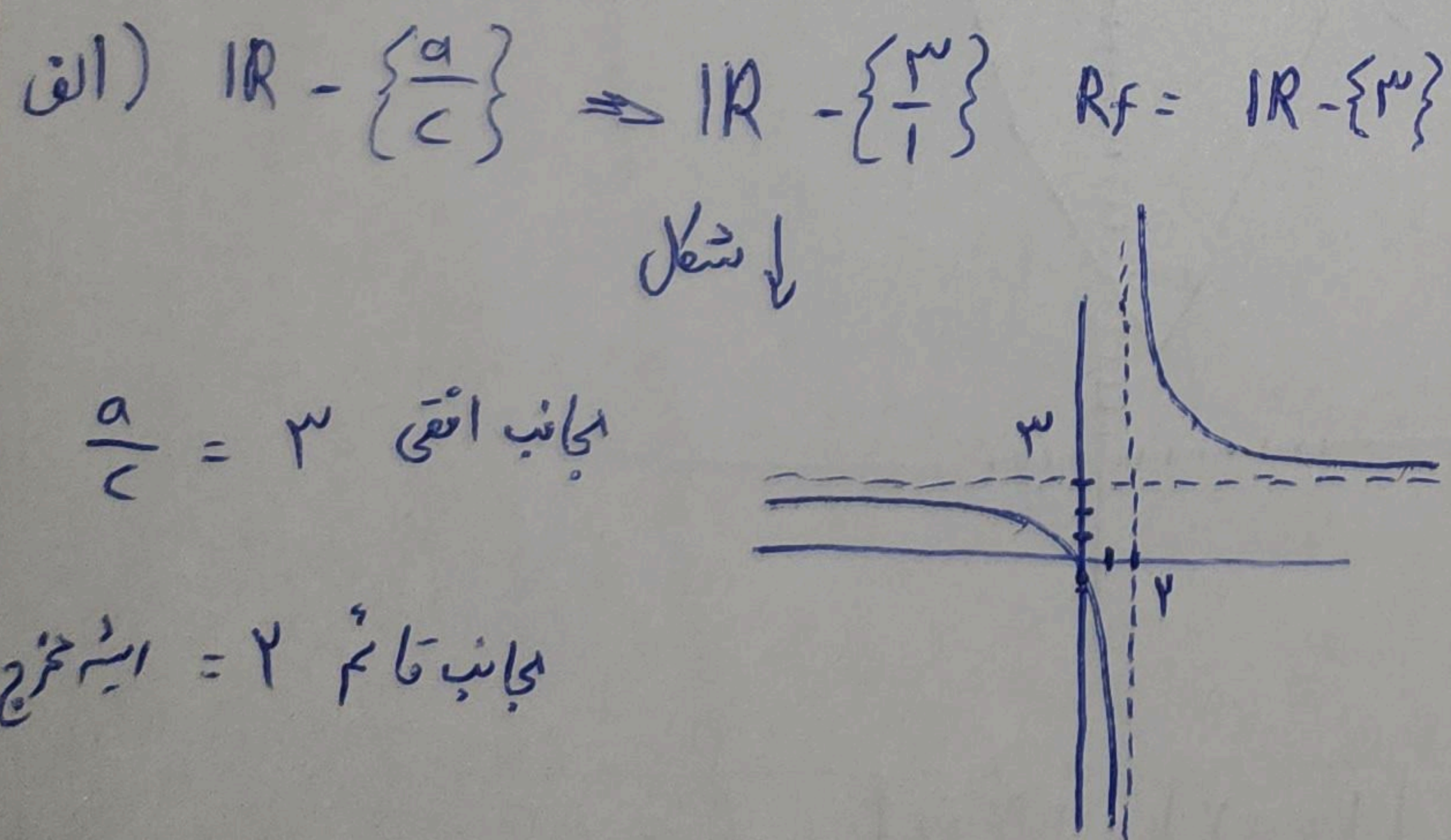


بزرگترین توان فرد (الف) $\Rightarrow \mathbb{R}$

زیر عبارت به (ج)
 دلیل بزرگترین توان فرد
 $\Rightarrow \mathbb{R} \xrightarrow{\text{زیر رادیکال}} [0, +\infty)$

بزرگترین توان فرد (ب) $\Rightarrow \mathbb{R}$

عبارت توان ۲
 فرد پس $\Rightarrow \mathbb{R} \xrightarrow{\text{عبارت توان ۲}} [0, +\infty)$

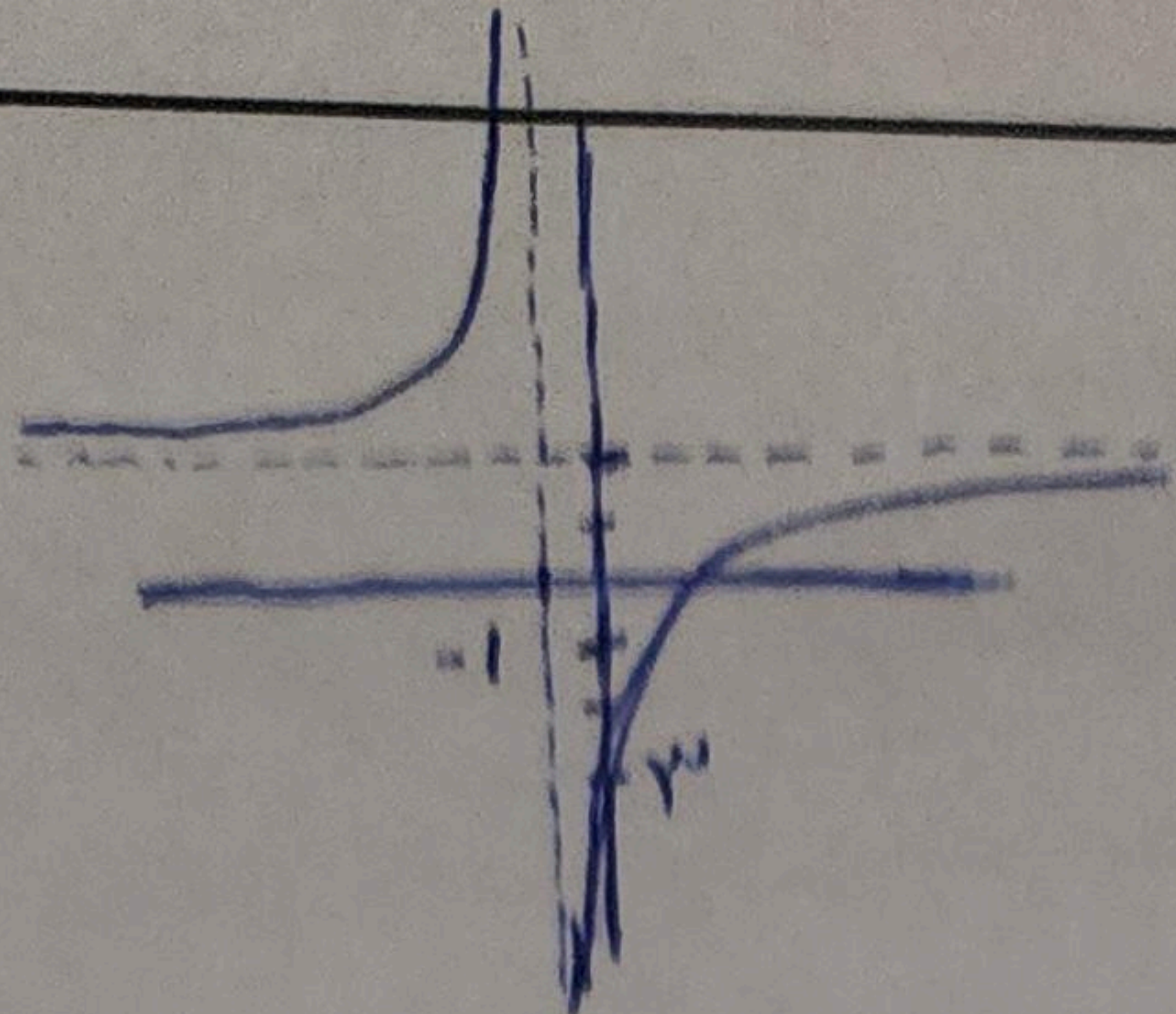


الف) $\sqrt{\frac{2x+4}{x+1}} \xrightarrow{\text{همگرافیک}} \sqrt{\mathbb{R} - \left\{\frac{a}{c}\right\}} \rightarrow \mathbb{R}^+ - \sqrt{2}$
 $R_f = [0, +\infty) - \{\sqrt{2}\}$

ب) $\sqrt{\frac{3x+1}{2-x}} \xrightarrow{\text{همگرافیک}} \sqrt{\mathbb{R} - \frac{a}{c}}$
 $\downarrow \quad \downarrow$
 $\mathbb{R}^+ \quad \sqrt{-3}$
 $\downarrow$
 α ناممکن
 $R_f = [0, +\infty)$

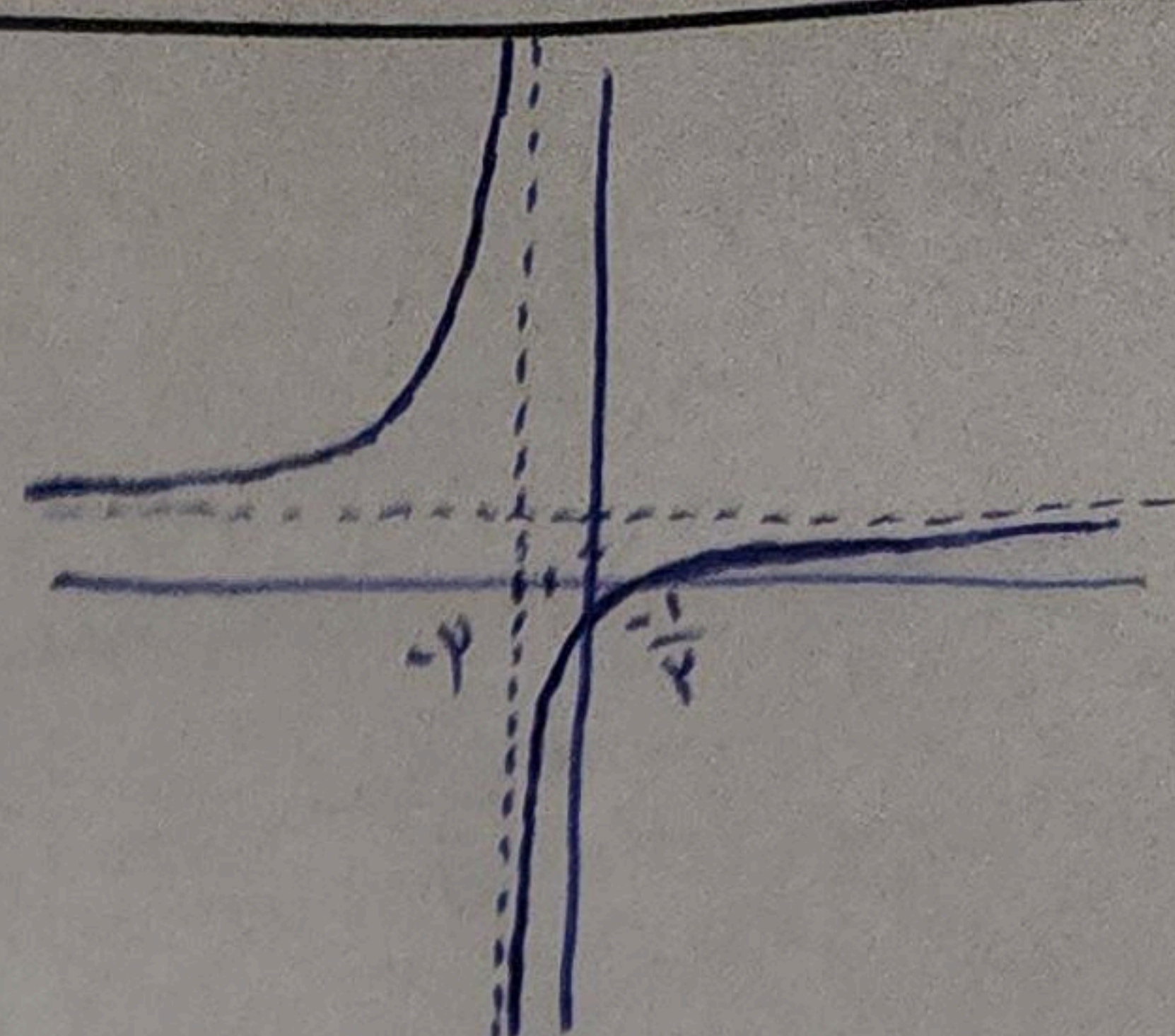
الف) $\frac{2x-3}{x+2}$

بجانب افقی (a) = 2
بجانب قائم (a) = -1



ب) $\frac{2x-1}{x+2}$

بجانب قائم (a) = -2
بجانب افقی (a) = 2



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الف) $\sin x + \frac{1}{\sin x} \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$
مهم مثبت و مهم منفی

ج) $\frac{\sqrt[3]{2x^3+1}}{\sqrt[3]{2x}} \Rightarrow \sqrt[3]{2x} + \frac{1}{\sqrt[3]{2x}} \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$
مهم مقدار مثبت و منفی

ب) $\frac{x^6+1}{x^3} \Rightarrow x^3 + \frac{1}{x^3} \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$
مهم مثبت و مهم منفی

د) $\sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow R_f = [2, +\infty)$
مهم مثبت

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الف) $x^2 + \frac{1}{x^2+3} \rightarrow$ کمترین مقدار عبارت در $x=0$ است $\rightarrow 0 + \frac{1}{3} = \frac{1}{3}$

$R_f = [\frac{1}{3}, +\infty)$

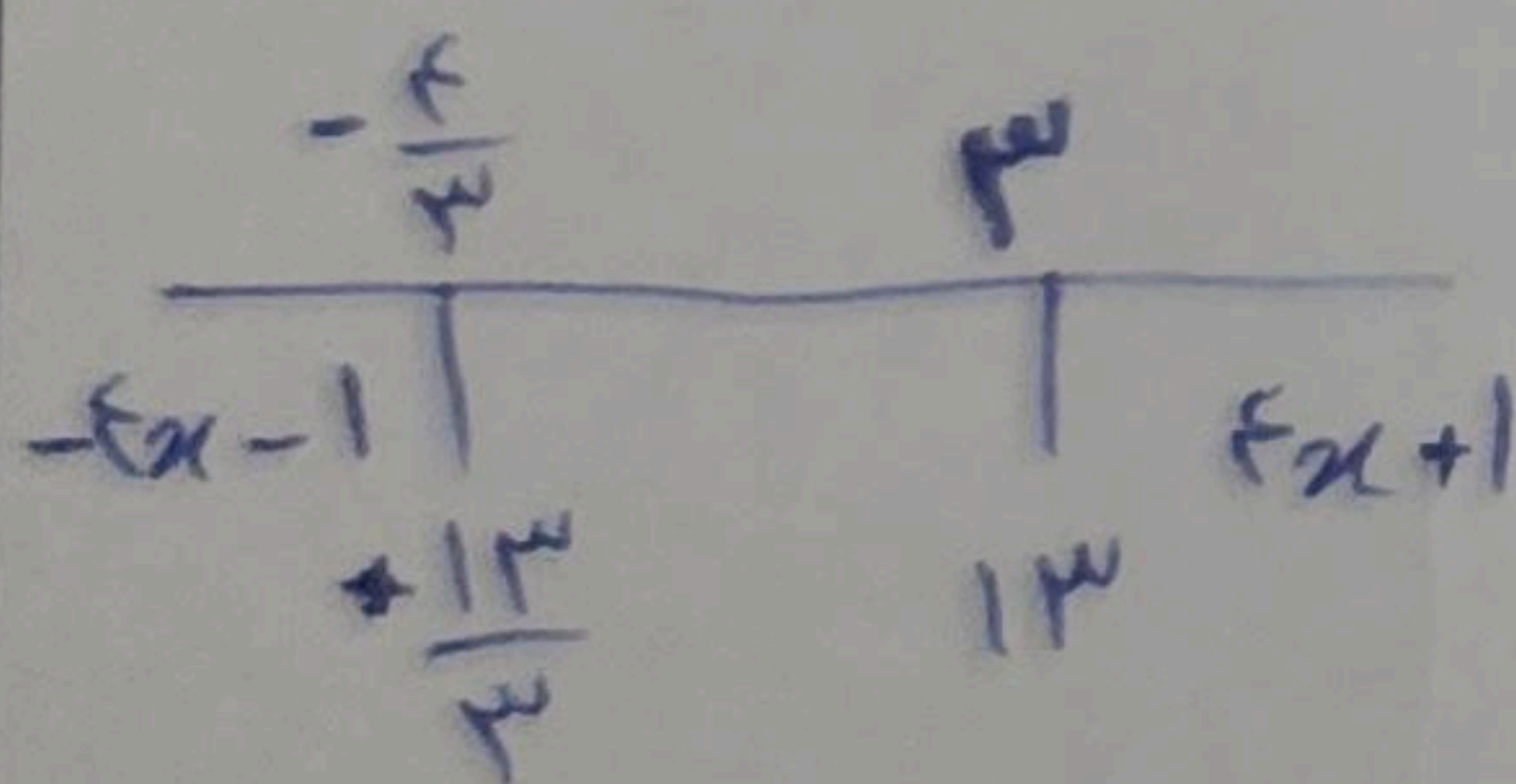
ب) $\frac{x^2+5}{\sqrt{x^2+4}} \Rightarrow \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}}$

کمترین مقدار عبارت در $x=0$ است $\rightarrow \sqrt{4} + \frac{1}{\sqrt{4}} = \frac{5}{2}$

$R_f = [\frac{5}{2}, +\infty)$

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$y = |x-3| + |3x+4|$

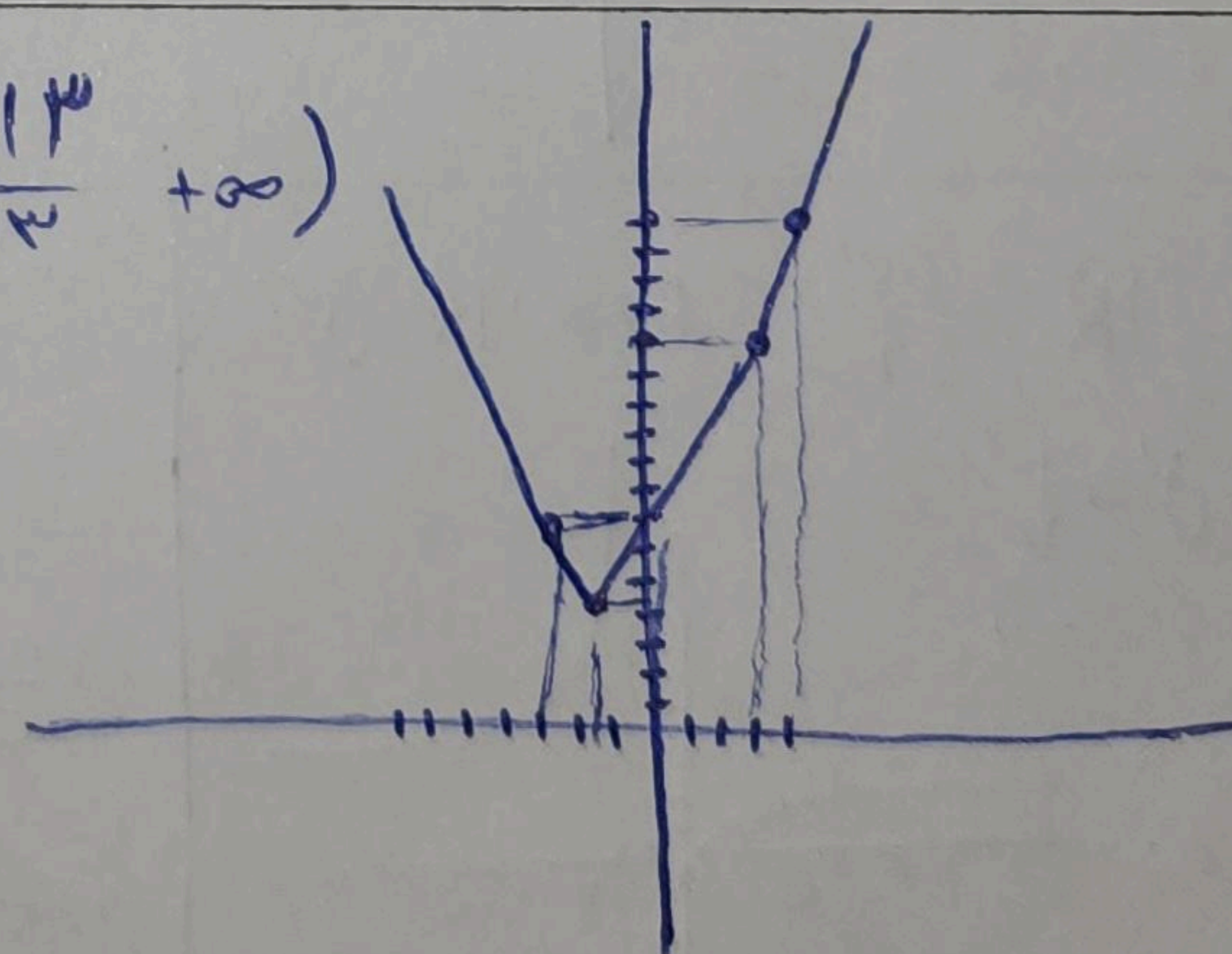


روش 1)

$\begin{cases} x \geq 3 & 4x+1 \\ -\frac{4}{3} < x < 3 & 2x+7 \\ x < -\frac{4}{3} & -4x-1 \end{cases}$

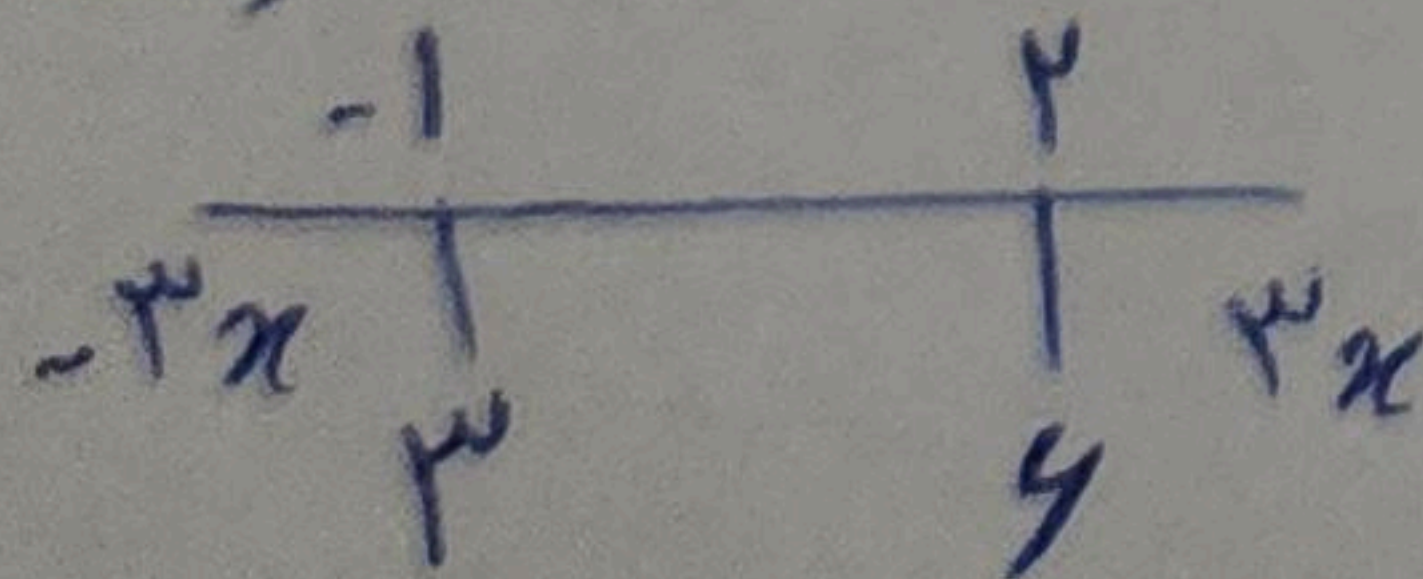
روش 2)
(ضابطه بندی)

$R_f = [\frac{13}{2}, +\infty)$

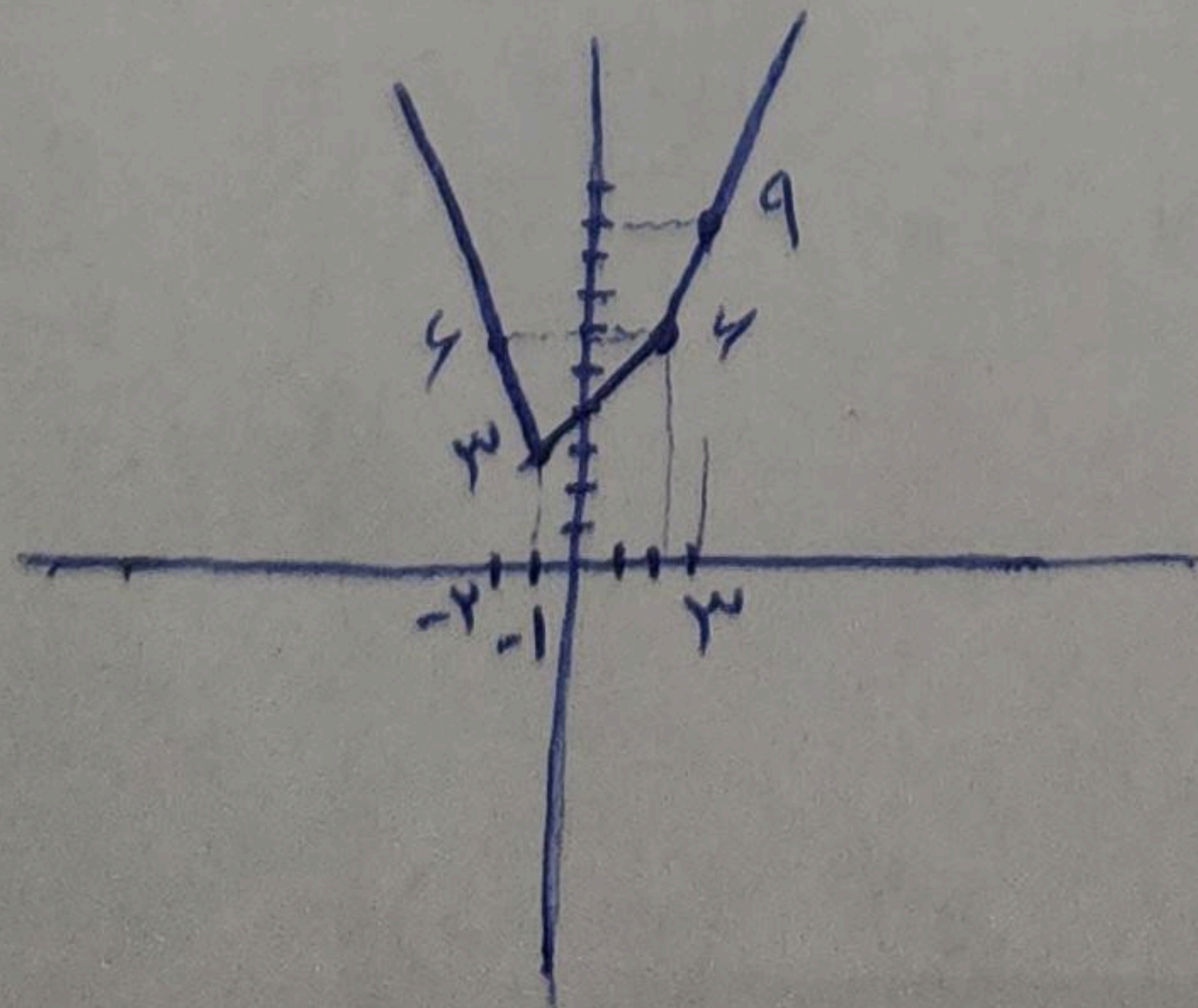


9

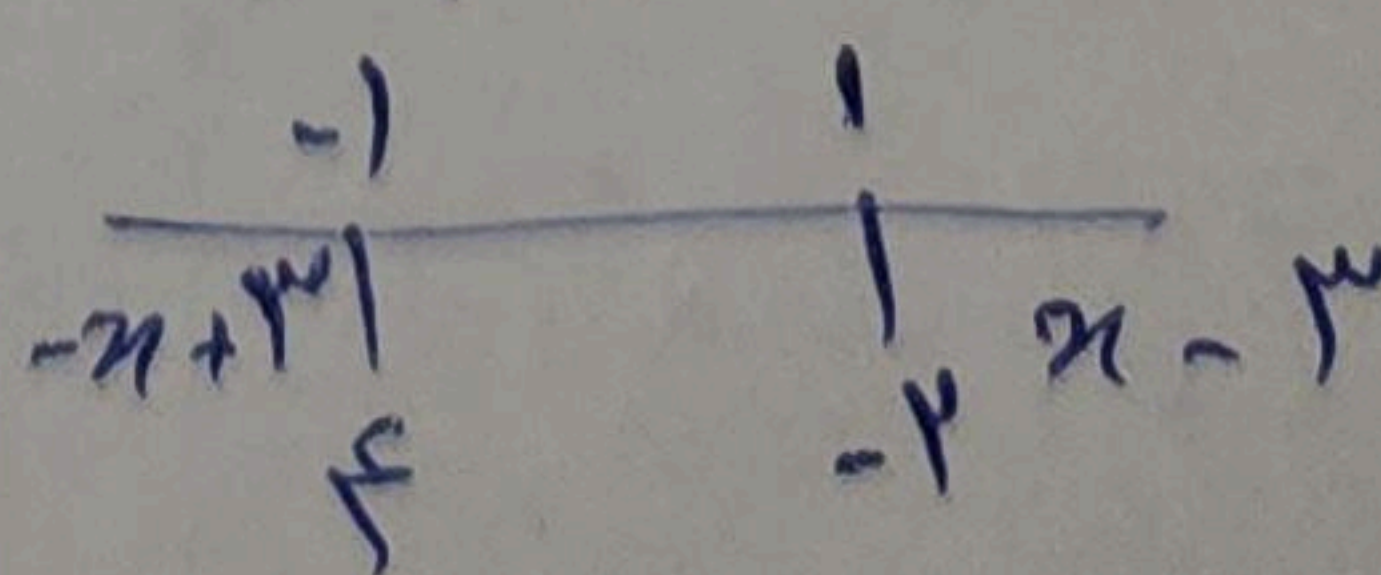
الف) $|x-2| + |2x+2|$



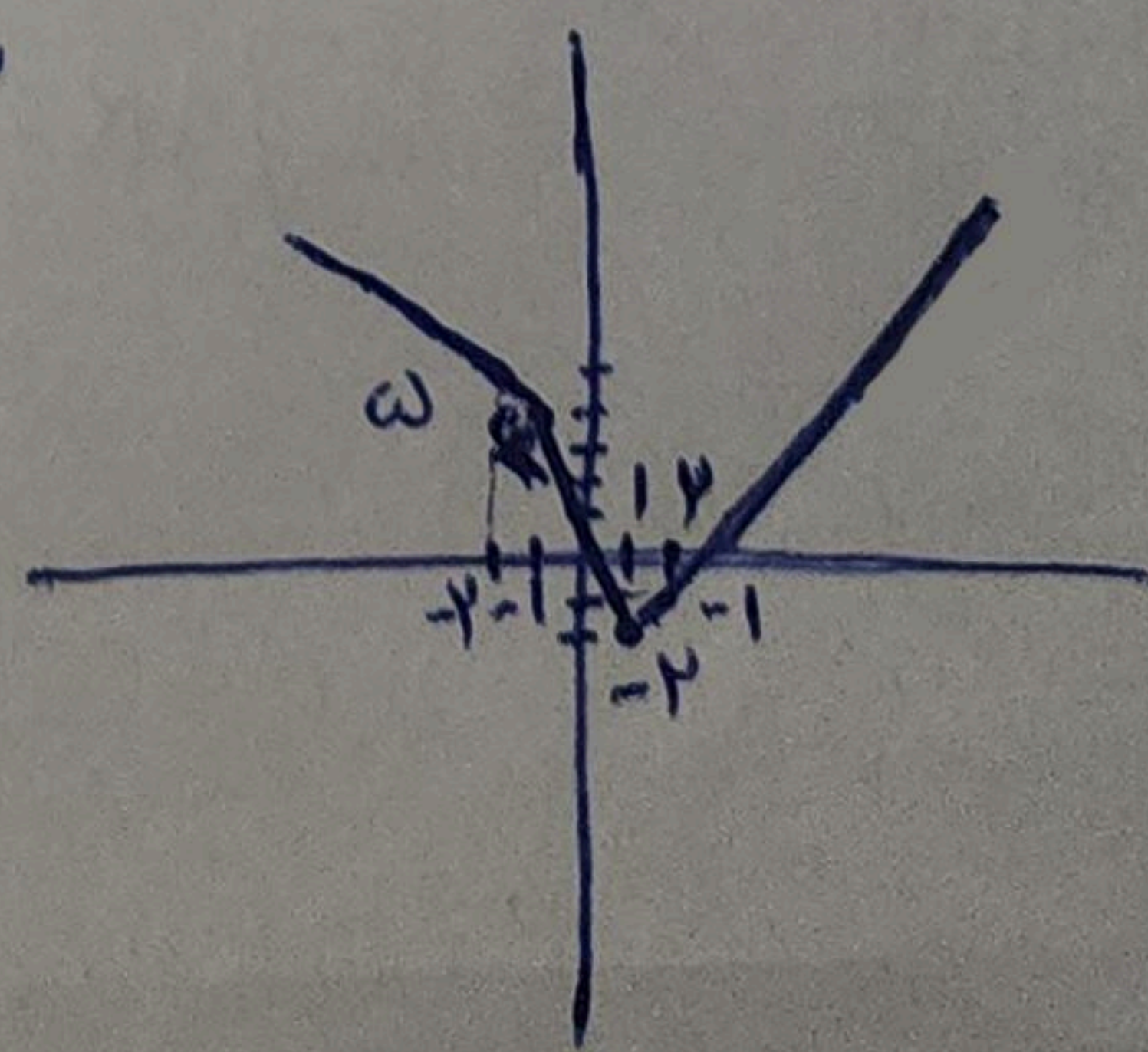
$R_f = [3, +\infty)$



ب) $|2x-2| - |x+1|$



$R_f = [-2, +\infty)$



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