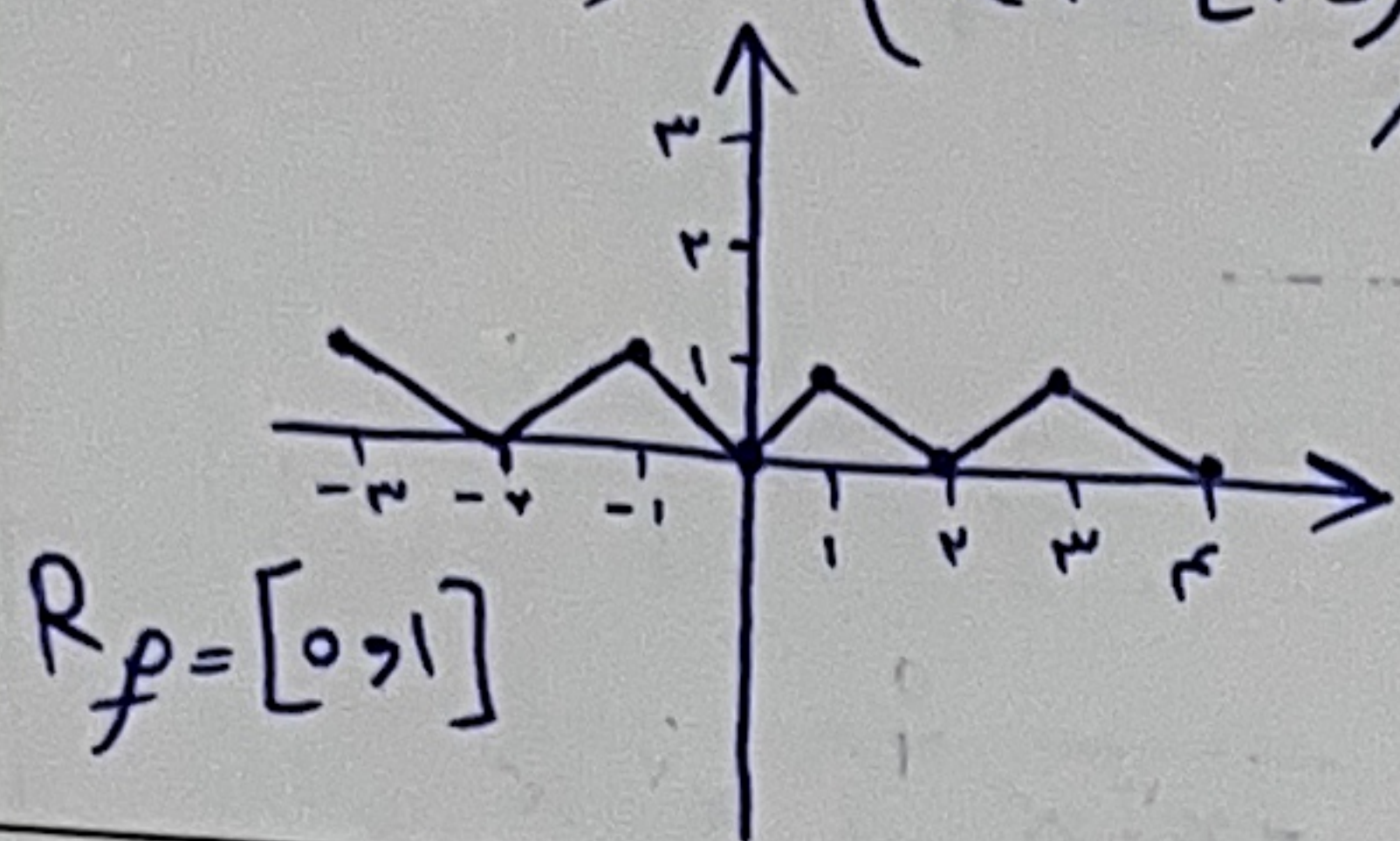


$$y = \left(x - 2 \left[\frac{x}{4} \right] \right)^2 = \left(2 \left(\frac{x}{2} - \left[\frac{x}{2} \right] \right) \right)^2$$



$$R_f = [0, 4]$$

$$-\sin x + \log y - 4 = 0$$

$$\log y = \sin x + 4 \rightarrow \begin{cases} \sin x = -1 \rightarrow \log y = 3 \\ \sin x = 1 \rightarrow \log y = 5 \end{cases}$$

$$3 \leq \log y \leq 5$$

$$R_f = [1, \dots, 100000]$$

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

$$R_f = [a, b] \cup (c, +\infty)$$

$$y^2 = \frac{x^2 - 4}{x^2 - 9} \rightarrow x^2 = \frac{-4y^2 + 4}{y^2 - 1} = \frac{4y^2 - 4}{y^2 - 1} \rightarrow x = \sqrt{\frac{4y^2 - 4}{y^2 - 1}}$$

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

$$R_f = \left[-\frac{y}{x}, \frac{y}{x} \right] \cup (1, +\infty)$$

$$\frac{-1}{+\frac{1}{4}} - \frac{y}{x} + \frac{y}{x} - \frac{1}{-\frac{1}{4}} +$$

$$f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}} + 1 - 1$$

$$\rightarrow \left(\sqrt{x + \frac{1}{x}} + 1 \right)^2 - 1 \rightarrow \text{این تابع از نظر برد باتابع}$$

$$\left(\sqrt{x + \frac{1}{x}} \right)^2 - 1 \rightarrow \text{برابر است چون انتقال طولی}$$

$$\left(\sqrt{x + \frac{1}{x}} \right)^2 \rightarrow R = [2, +\infty) - 1 \rightarrow R_f = [1, +\infty)$$

$$y = (3 - \sin x)(1 + \sin x)$$

$$\sin x = 1 \rightarrow y = 4$$

$$\sin x = -1 \rightarrow y = 0$$

$$\rightarrow R_f = [0, 4]$$

$$f(x) = -\frac{1}{x}x + 10$$

$$D_f = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$x=1 \rightarrow y = 9 + \frac{1}{x}$$

$$x=4 \rightarrow y = 1$$

$$x=2 \rightarrow y = 9 + \frac{1}{x}$$

$$x=7 \rightarrow y = 7 + \frac{1}{x}$$

$$x=3 \rightarrow y = 9$$

$$x=1 \rightarrow y = 7 + \frac{1}{x}$$

$$x=4 \rightarrow y = 1 + \frac{1}{x}$$

$$x=9 \rightarrow y = 7$$

$$x=5 \rightarrow y = 1 + \frac{1}{x}$$

$$\text{جمع } y \text{ ها} = \binom{3}{2} 9 + \binom{3}{2} 1 + \binom{3}{2} 7 + 3 \left(\frac{1}{x} + \frac{1}{x} \right) \Rightarrow 72$$

$$f(x) = \sqrt{ax^2 + bx + c} \rightarrow D_f = [2, +\infty) \xrightarrow{-\frac{y}{x} +} a(x-2)^2 \rightarrow f(2) = 1 \rightarrow a = 1$$

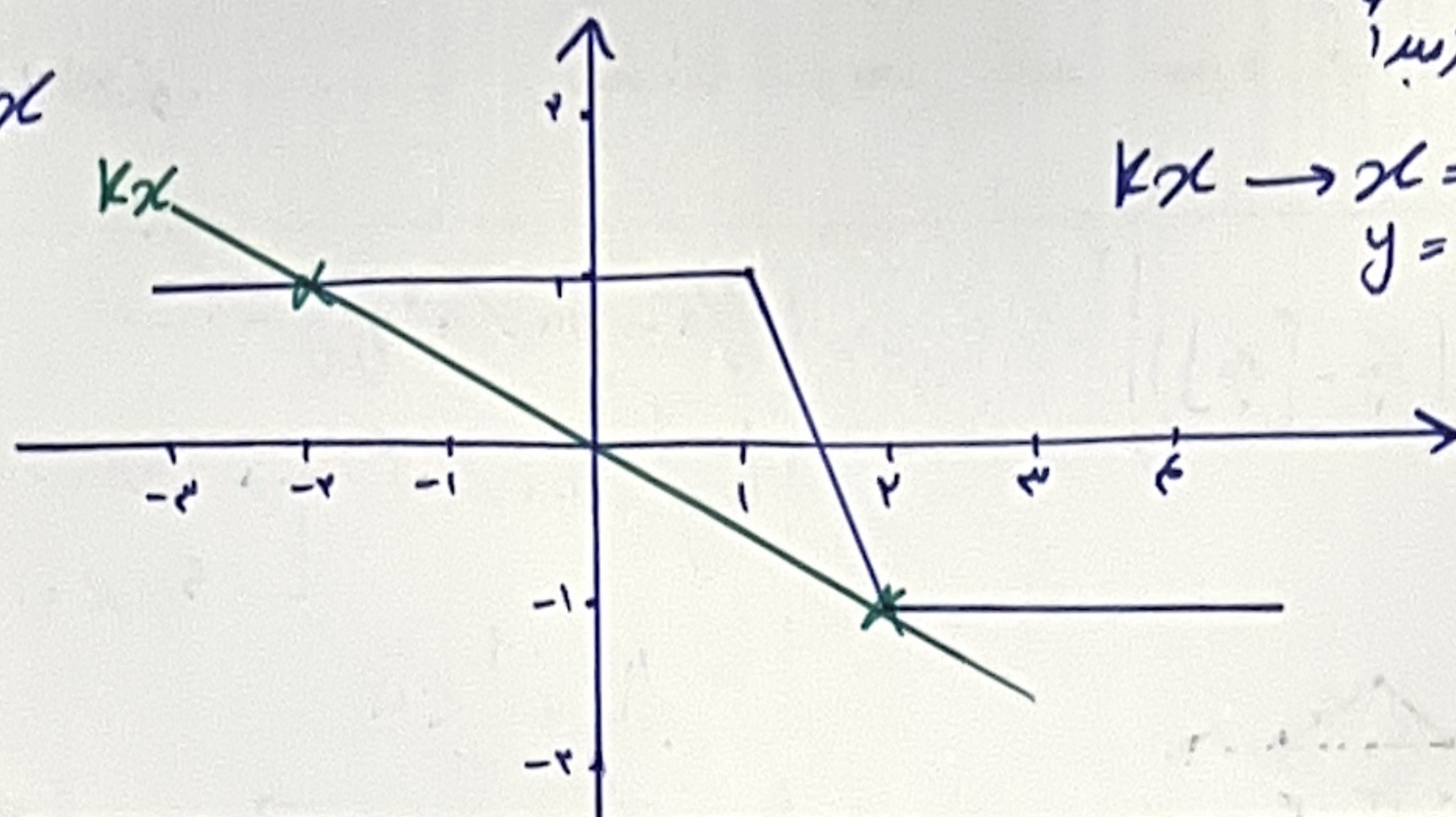
$$f(x) = \sqrt{x^2 - 4x + 4} \rightarrow a = 1, b = -4, c = 4$$

$$g(x) = \sqrt{-4x^2 + x - 1} \rightarrow \Delta < 0$$

$$\emptyset = \text{بردار تابع}$$

$$|x-2| - |x-1| = kx$$

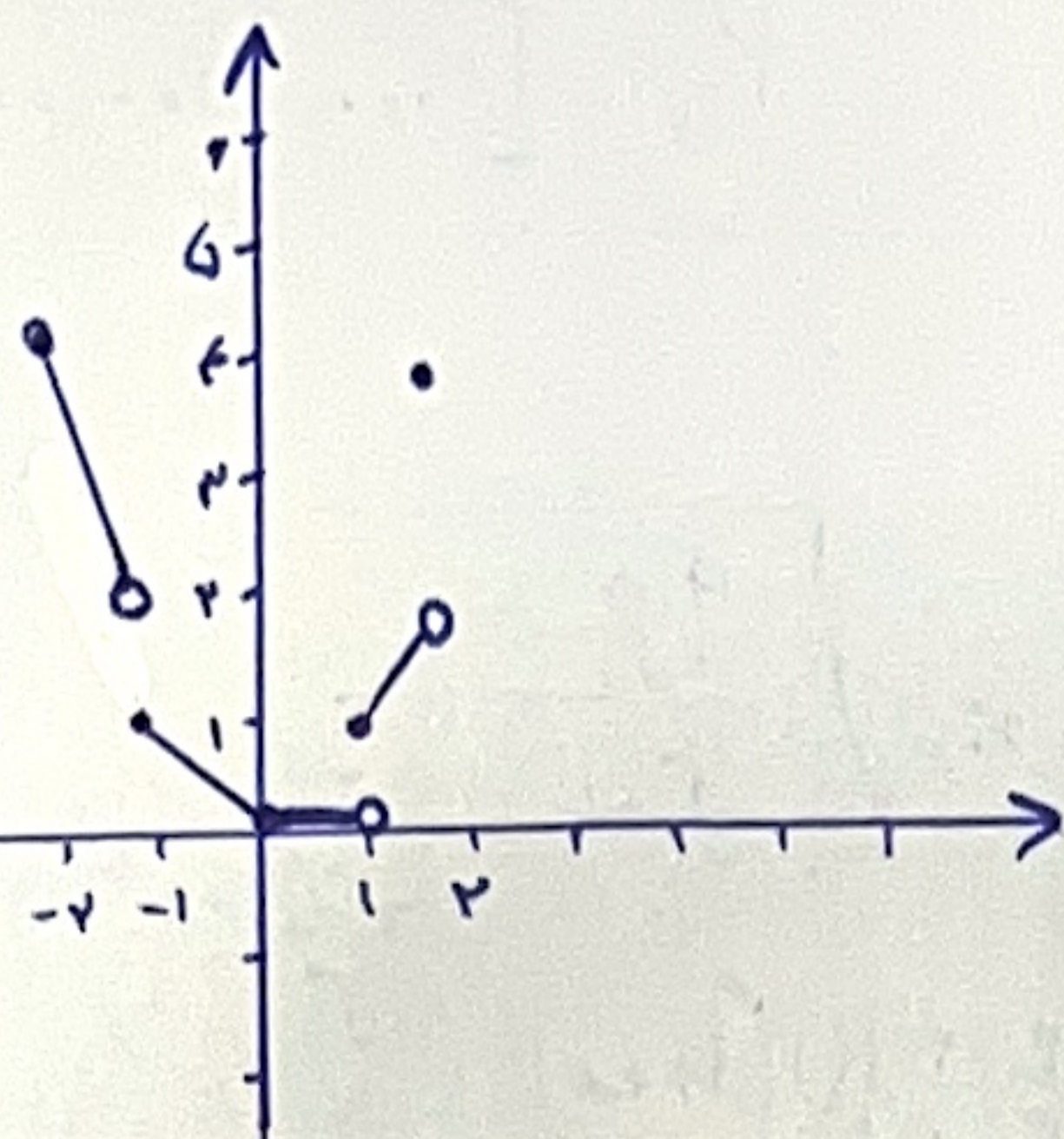
$$\begin{aligned} x=2 &\rightarrow y=-1 \\ x=1 &\rightarrow y=-1 \\ x=1 &\rightarrow y=1 \\ x=0 &\rightarrow y=1 \end{aligned}$$



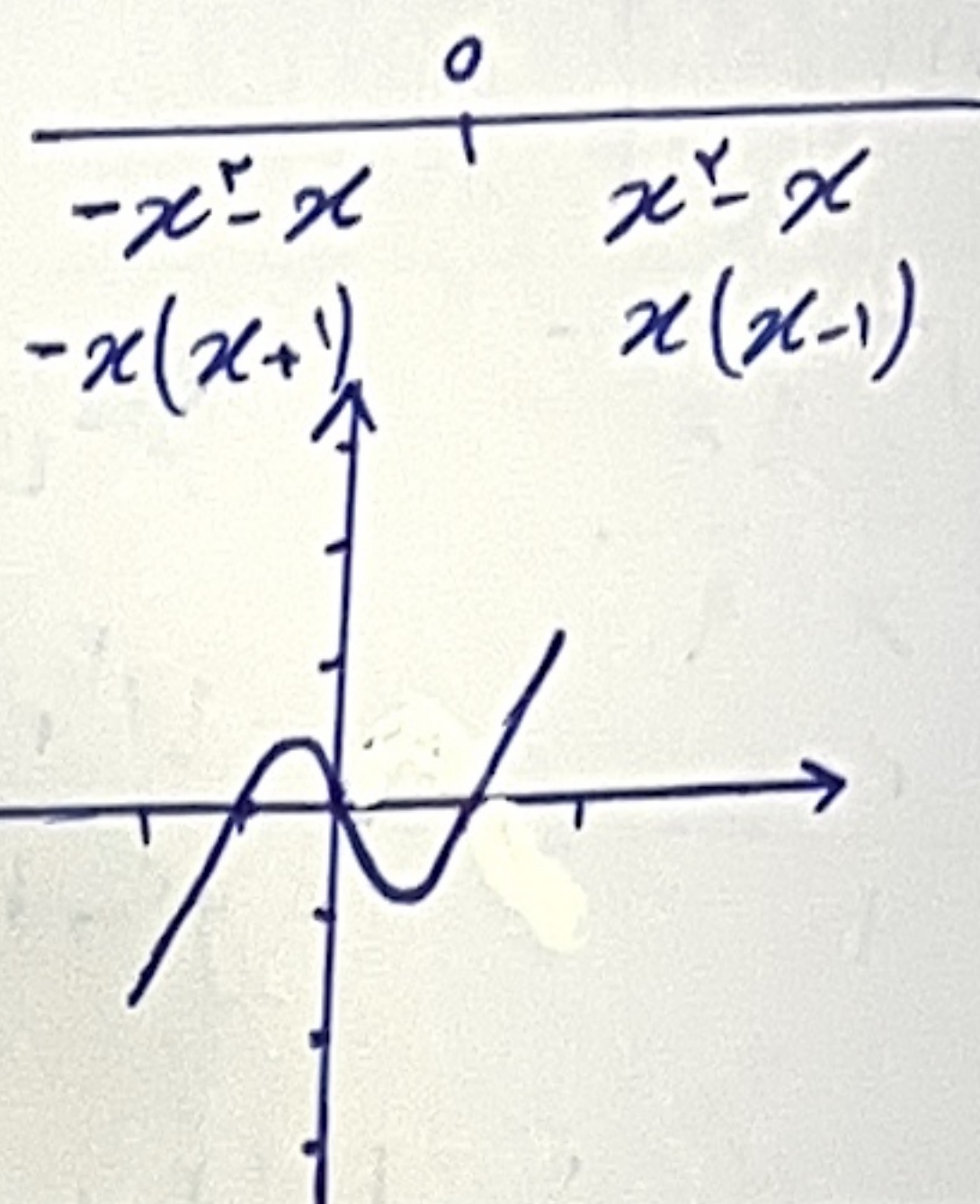
$$kx \rightarrow x = -2 \quad y = 1 \quad \left\} \rightarrow k = -\frac{1}{2}$$

$$y = x[x]$$

$$\begin{aligned} -1 < x < 0 &\rightarrow -x \\ 0 < x < 1 &\rightarrow 0 \\ 1 < x < 2 &\rightarrow x \\ x \geq 2 &\rightarrow 2 \end{aligned}$$



$$y = x|x| - x$$



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

$$x = \frac{y}{2} \rightarrow y \neq 0$$

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

$$R_f = \mathbb{R} - \{0, -2\}$$

$$a+b = -2$$

$$f(x) = \frac{x - \sqrt{x} + 3}{x - 2\sqrt{x} + 1} = \frac{x - \sqrt{x} + 1 - 2}{x - 2\sqrt{x} + 1} \rightarrow \frac{(\sqrt{x}-1)^2}{(\sqrt{x}-1)^2} - \frac{1}{(\sqrt{x}-1)^2}$$

$$\left(\frac{\sqrt{x}-1}{\sqrt{x}-1}\right)^2 - \left(\frac{1}{\sqrt{x}-1}\right)^2 = \left(\frac{\sqrt{x}-1}{\sqrt{x}-1}\right) \left(\frac{\sqrt{x}-1-1}{\sqrt{x}-1}\right) = \frac{(\sqrt{x}-1)(\sqrt{x}-2)}{(\sqrt{x}-1)(\sqrt{x}-1)} \xrightarrow{x \neq 1} \frac{\sqrt{x}-2}{\sqrt{x}-1}$$

$$y = \frac{\sqrt{x}-2}{\sqrt{x}-1} \rightarrow \sqrt{x} = \frac{-y+2}{y-1} \rightarrow \sqrt{x} = \frac{y-2}{y-1} \quad \left[R_f = (-\infty, 1) \cup [2, +\infty) \right]$$

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

$$\text{این تابع از برای } x \neq \pm 1 \text{ است}$$

$$\begin{aligned} x=+1 &\rightarrow y=3 \\ x=-1 &\rightarrow y=1 \end{aligned}$$

$$3+1=4$$

در $x = \pm 1$ تعریف نمی شود
برای این دو x تعریف نمی شود.