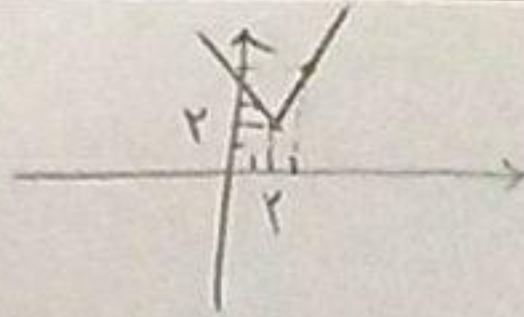
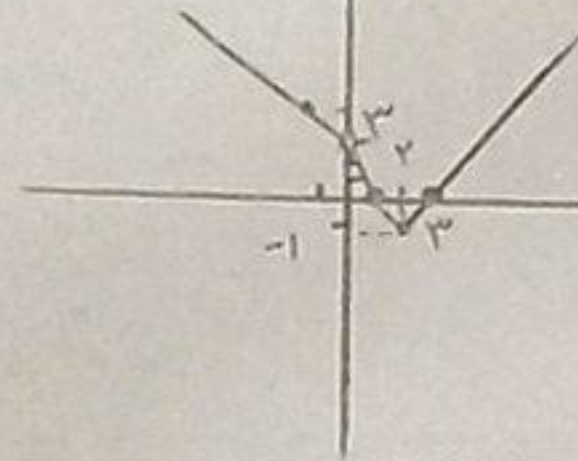


الف)

$$\begin{array}{r|l} x-2x+2 & x+2x-2 \\ \hline = -x+2 & \textcircled{2} = 2x-2 \end{array}$$



$$R_f \text{ s } [2, +\infty)$$

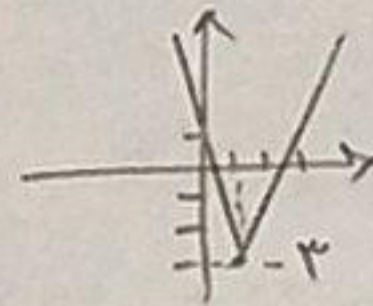


$$R_f \text{ s } [-1, +\infty)$$

ب)

$$\begin{array}{r|l} 2-x-x+1+x & 2-x-x+1 \\ \hline = 2-x & \textcircled{3} = 2-2x \\ & \textcircled{0} = 1-x \\ & \textcircled{-1} = x-2 \end{array}$$

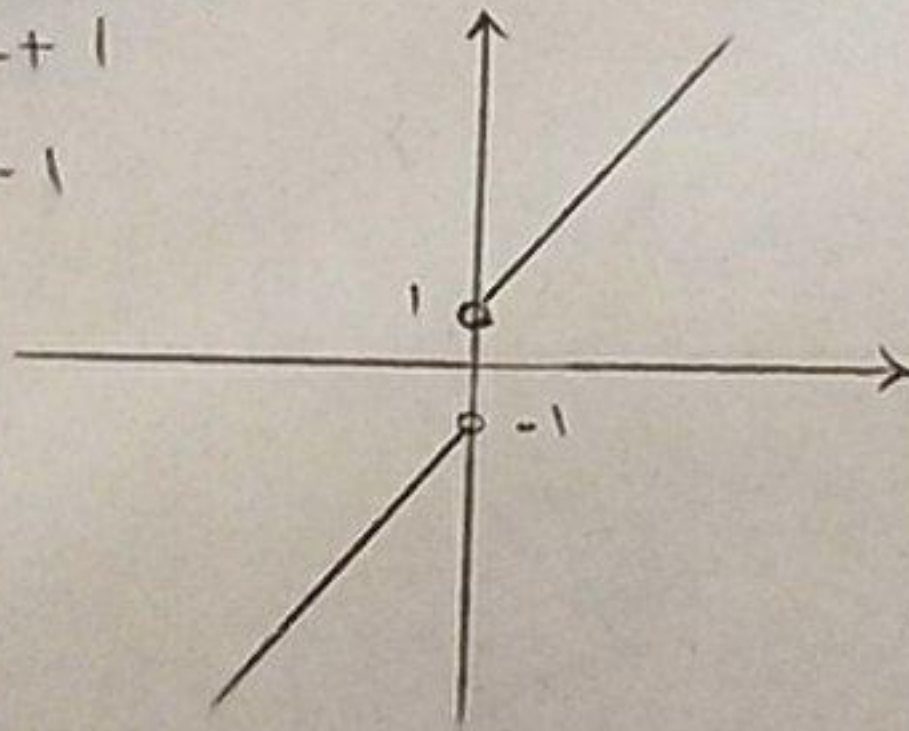
* خط افقی $y=k$ را بر روی نمودار رد نقطه قطع می‌کنند



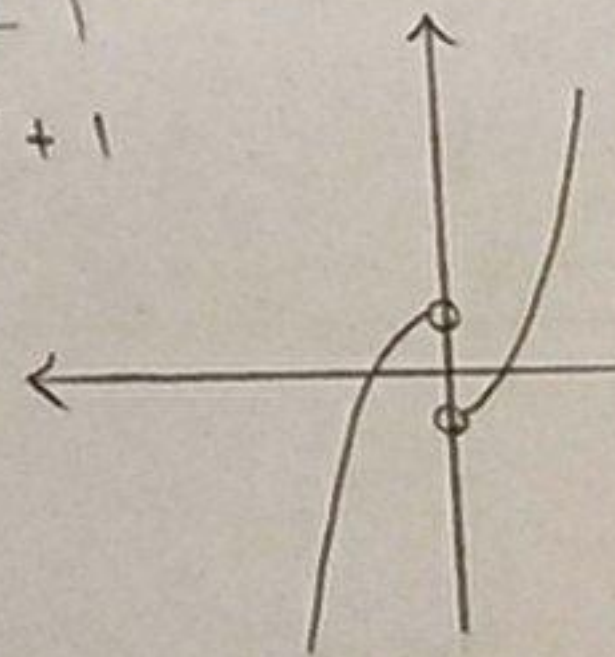
$$\rightarrow k \leq -2$$

$$\begin{cases} 2x+2 & x \leq -2 \\ -2x+1 & -2 \leq x \leq 1 \\ -2x+2 & x \geq 1 \end{cases} \rightarrow R_f \text{ s } [-3, +\infty)$$

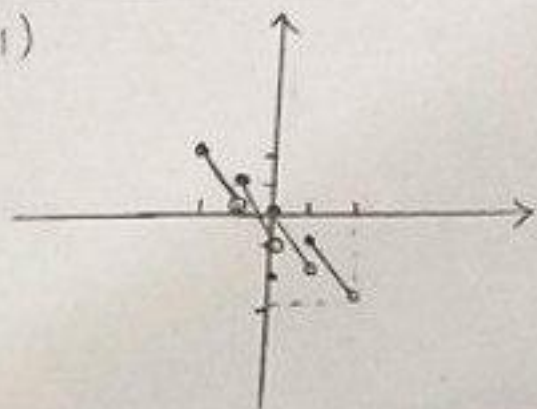
الف) $x > 0 \rightarrow x+1$
 $x < 0 \rightarrow x-1$



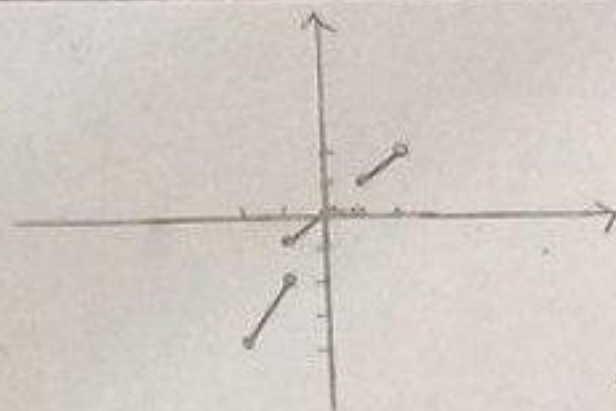
ب) $x > 0 \rightarrow x-1$
 $x < 0 \rightarrow -x^2+1$



الف)



ب)



الف) $\forall x \in \mathbb{R} \rightarrow x - [x] \Rightarrow 0 \leq f(x) < 1$

ب) $f(x - [x]) \rightarrow 0 \leq x - [x] < 1 \Rightarrow 0 \leq f(x - [x]) < 1$

د ج) $\forall \left(\frac{x}{a} - \left[\frac{x}{a}\right]\right) \rightarrow 0 \leq \frac{x}{a} - \left[\frac{x}{a}\right] < 1 \xRightarrow{x \geq 0} 0 \leq f(x) < a$

هـ) $[x] - x \rightarrow 0 \leq f(x) < -1$

$$\star -\sqrt{a^2+b^2} \leq a \sin x + b \cos x \leq \sqrt{a^2+b^2}$$

الف) $-\sqrt{17} \leq f(x) \leq \sqrt{17}$ ب) $-5 \leq f(x) \leq 5$

ج) $[-\sqrt{29}] \leq f(x) \leq [\sqrt{29}] \Rightarrow -4 \leq f(x) \leq 5$

د) $[-\sqrt{5}] \leq f(x) \leq [\sqrt{5}] \Rightarrow 0 \leq f(x) \leq \sqrt{5}$

الف) $\sin x \leq \frac{-b}{a} \leq \frac{c}{r} \rightarrow$ مقدار غیر قابل قبول برای $\sin x$ $\left. \begin{array}{l} \sin x = 1 \Rightarrow y \geq 4 \\ \sin x = -1 \Rightarrow y \leq 0 \end{array} \right\} \Rightarrow R_f = [0, 4]$

ب) $\sin x \leq \frac{-b}{a} \leq \frac{c}{r} \Rightarrow y \leq \frac{18}{14} - \frac{24}{14} + \frac{22}{14} \leq \frac{16}{14} \leq \frac{v}{\lambda} \left. \begin{array}{l} \sin x = 1 \Rightarrow y \leq v \\ \sin x = -1 \Rightarrow y \leq 1 \end{array} \right\} \Rightarrow R_f = [\frac{v}{\lambda}, v]$

$$\sin x = 1 \Rightarrow y = 1$$

الف) $\sin^2 x = 1 - \sin^2 x = 1 - y = 1 - (-\sqrt{x} - 1)$

$$0 \leq \sin^2 x \leq 1 \rightarrow -\sqrt{x} \leq -\sqrt{x} - 1 \leq -1 \Rightarrow R_f \subset [-\sqrt{x}, -1]$$

ب) $\frac{\cos 2x}{\sin x} = \frac{\cos^2 x - \sin^2 x}{\sin x} = \cos x \sin x = \sin 2x \Rightarrow R_f \subset [-1, 1]$

الف) $2^{1-k} \leq \sin^k x + \cos^k x \leq 1 \Rightarrow \frac{1}{2} \leq f(x) \leq 1$

ب) $[\frac{1}{2}] \leq [f(x)] \leq [1] \Rightarrow R_f \subset [0, 1]$

الف) $2x^2 + 7x - 4 \mid \frac{x+1}{2x-1} \Rightarrow y \leq 2x-1 \xrightarrow{x \geq 1} y \geq -9 \Rightarrow R_f \subset \mathbb{R} - \{-9\}$

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

$$\text{Min} \left\{ \begin{array}{l} \frac{-b}{2a} = -\frac{1}{2} \\ \frac{1}{2} - \frac{1}{2} + \frac{1}{2} = \frac{1}{2} \end{array} \right.$$

$$\Rightarrow R_f \subset [\frac{1}{2}, +\infty) - \{3\}$$