

$$x-1=t \Rightarrow \frac{1}{t} = |t| \xrightarrow{t>0} \frac{1}{t} = t \Rightarrow t^2=1 \rightarrow t=1, x=2$$

$$\xrightarrow{t<0} \frac{1}{t} = -t \Rightarrow t^2=-1 \rightarrow X$$

پس تنها یک ریشه دارد $\leftarrow x=2$

$$\text{الف) } -2 < \frac{2x-1}{x} < 2 \rightarrow \frac{2x-1}{x} < 2 \rightarrow \frac{-1}{x} < 0 \rightarrow x > 0 \quad (1)$$

$$-2 < \frac{2x-1}{x} \rightarrow \frac{4x-1}{x} > 0 \Rightarrow x > \frac{1}{4} \leq x < 0 \quad (2) \xrightarrow{(1) \cap (2)} x \in (\frac{1}{4}, +\infty)$$

$$\text{ب) } \frac{x-2}{2x+1} > 1 \Rightarrow \frac{-x-3}{2x+1} > 0 \Rightarrow -3 < x < -\frac{1}{2}$$

$$\frac{x-2}{2x+1} < -1 \Rightarrow \frac{3x-1}{2x+1} < 0 \Rightarrow -\frac{1}{3} < x < \frac{1}{3}$$

$$\left. \begin{array}{l} -3 < x < -\frac{1}{2} \\ -\frac{1}{3} < x < \frac{1}{3} \end{array} \right\} x \in (-3, -\frac{1}{2}) \cup (-\frac{1}{2}, \frac{1}{3})$$

$$\text{① } x+4 > 0 \Rightarrow x > -4, \quad x^2 < x+4 \Rightarrow x^2-x-4 < 0 \Rightarrow (x-3)(x+2) < 0$$

$$\Rightarrow \frac{-2}{+} \mid \frac{-}{-} \mid \frac{+}{+} \rightarrow -2 < x < 3 \quad \checkmark \text{ سازگار ①}$$

$$\text{② } x+4 < 0 \Rightarrow x < -4 \rightarrow x^2 < -4-x \Rightarrow x^2+x+4 < 0 \rightarrow \Delta = 1-24 < 0$$

$$\text{③ } \rightarrow x \in (-2, 3) \xrightarrow{\text{میزبانه}} a = \frac{-2+3}{2} = \frac{1}{2}$$

$$\xrightarrow{\text{میزبان}} r = \frac{3-(-2)}{2} = \frac{5}{2}$$

$$\left. \begin{array}{l} a = \frac{1}{2} \\ r = \frac{5}{2} \end{array} \right\} \left| x - \frac{1}{2} \right| < \frac{5}{2} \Rightarrow \boxed{a = \frac{1}{2}}$$

$$\text{فصل اول} \rightarrow x = -1, 0, 2 \Rightarrow x \leq -1 \rightarrow y = -x-1+2x-x+2 = 1$$

$$-1 \leq x \leq 0 \rightarrow y = (x+1) - (-2x) - (x-2) = 2x+3 \Rightarrow x=-1 \rightarrow y=1$$

$$x=0 \rightarrow y=3$$

$$0 \leq x \leq 2 \rightarrow y = x+1-2x-x+2 = 3-2x \rightarrow x=0 \rightarrow y=3, \quad x=2 \rightarrow y=-1$$

$$x \geq 2 \rightarrow y = (x+1) - 2x + x - 2 = -1$$

$$\text{کسر + کسر} \rightarrow 3 + (-1) = 2$$

$$y_1 = \left| \frac{x}{2} \right| - 2 \xrightarrow{\text{فصل دوم و اول}} y_2 = \left| \frac{x+4}{2} \right| - 1$$

$$\Rightarrow \left| \frac{x}{2} \right| - 2 = \left| \frac{x+4}{2} \right| - 1 \xrightarrow{\times 2} |x| - 4 = |x+4| - 2$$

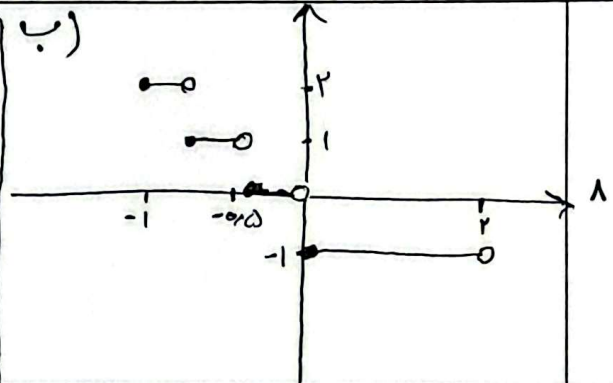
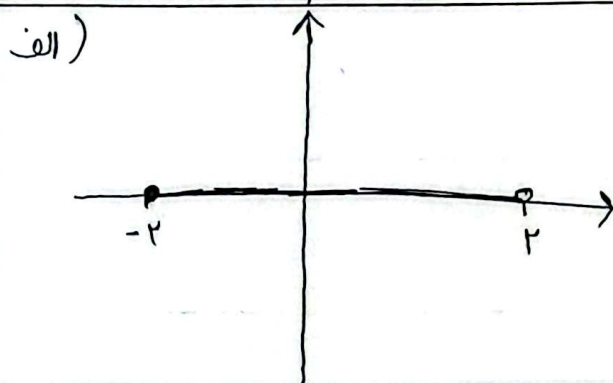
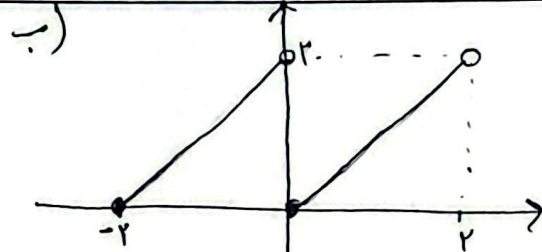
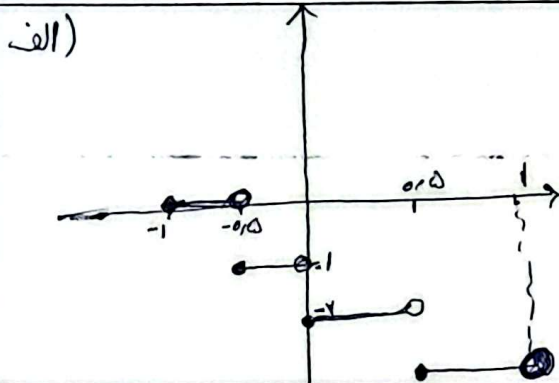
$$\Rightarrow |x| - |x+4| = 2 \rightarrow x \geq 0 \Rightarrow x-x=4 \quad X$$

$$\rightarrow -4 \leq x < 0 \Rightarrow -2x = 4 \Rightarrow x = -2$$

$$x < -4 \Rightarrow x = -4 \quad X$$

الف) $x=1, -2 \Rightarrow x < -2 \rightarrow f(x) = 1-x+x+2 = 3$ ①
 $-2 \leq x \leq 1 \rightarrow f(x) = 1-x-x-2 = -2x-1 \Rightarrow x=-2 \rightarrow f(-2)=3, f(1)=-1$
 $x \geq 1 \rightarrow f(x) = x-1-x+2 = 1$ ② ③ ④ $R_f = [-1, 3]$

ب) $f(x) = \frac{1}{x} - \frac{x+1}{x} \Rightarrow f(x) = \frac{1-(x+1)}{x} = \frac{-x}{x} = -1 \quad (x \neq 0)$
 $\Rightarrow R_f = \{-1\}$



$a + [b] = 4, 2 \rightarrow \text{عدد صحیح} = 0, 2 \rightarrow a = [a] + 0, 2$
 $b - [a] = 2, 4 \rightarrow \text{عدد صحیح} = 0, 4 \rightarrow b = [b] + 0, 4$

$\rightarrow [a] + 0, 2 + [b] + [b] + 0, 4 - [a] = 2[b] + 0, 6 = 4, 4$

$\Rightarrow b = \frac{4}{2} + 0, 4 = 2, 4$, $a = 4, 2 - 2 = 2, 2 \Rightarrow a + b = 2, 2 + 2, 4 = 4, 6$
 $[4, 6]$

$(1+\sqrt{2})^2 = a, (1-\sqrt{2})^2 = b \Rightarrow 1-\sqrt{2} \approx -0, 414 \Rightarrow 0 < b < 1$
 $a = 191 - b$

$\Rightarrow 191 < a < 192$

پس $(1+\sqrt{2})^2$ برابر است با 191