

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

$$\Rightarrow (t^2-1)(t^2+1) \Rightarrow ((x-1)-1)((x-1)+1)(x^2-2x+2) = 0$$

$$(t-1)(t+1) \quad \begin{matrix} x-2 \\ x \\ \Delta < 0 \end{matrix}$$

$$\Rightarrow x=0 \Rightarrow \frac{1}{-1} \neq |0-1| \quad x=2 \quad x=0$$

$$\Rightarrow x=2 \Rightarrow \frac{1}{1} = |2-1| \rightarrow \text{قصد} \Rightarrow \text{یک ریشه دارد} \Rightarrow \text{قصد}$$

الف) $\left| \frac{2x-1}{x} \right| < 2 \Rightarrow -2 < \frac{2x-1}{x} < 2 \rightarrow \frac{2x-1}{x} < 2 \rightarrow \frac{-1}{x} < 0 \Rightarrow \frac{1}{x} > 0 \Rightarrow x > 0$

$$\frac{2x-1}{x} > -2 \rightarrow \frac{4x-1}{x} > 0 \quad \begin{matrix} 0 & \frac{1}{4} & + \\ + & - & + \end{matrix} \rightarrow (-\infty, 0) \cup (\frac{1}{4}, +\infty) \Rightarrow D = (\frac{1}{4}, +\infty)$$

ب) $\left| \frac{x-2}{2x+1} \right| > 1 \Rightarrow 1 < \frac{x-2}{2x+1} < -1 \rightarrow \frac{x-2}{2x+1} > -1 \Rightarrow \frac{-x-3}{2x+1} > 0$

$$\Rightarrow \frac{x-5}{2x+1} < -1 \Rightarrow \frac{3x-1}{2x+1} < 0 \quad \begin{matrix} -\frac{1}{3} & \frac{1}{2} & + \\ + & - & + \end{matrix} \rightarrow (-\frac{1}{3}, \frac{1}{2}) \Rightarrow D = (-\frac{1}{3}, \frac{1}{2})$$

$$x^2 < |x+6| \rightarrow -x-6 < x^2 < x+6$$

$$x^2 < x+6 \rightarrow x^2-x-6 < 0 \rightarrow \Delta = 49 \Rightarrow \frac{-1 \pm 7}{2} \Rightarrow \begin{matrix} -2 & 3 \\ + & - & + \end{matrix} \rightarrow (-2, 3)$$

$$x^2 > -x-6 \rightarrow x^2+x+6 > 0 \rightarrow \Delta < 0 \quad \checkmark$$

$$\Rightarrow -\beta < x-\alpha < \beta \Rightarrow \underbrace{\alpha-\beta}_{-2} < x < \underbrace{\beta+\alpha}_3 \Rightarrow \begin{cases} \alpha-\beta = -2 \\ \alpha+\beta = 3 \end{cases}$$

$$2\alpha = 1 \Rightarrow \alpha = \frac{1}{2}$$

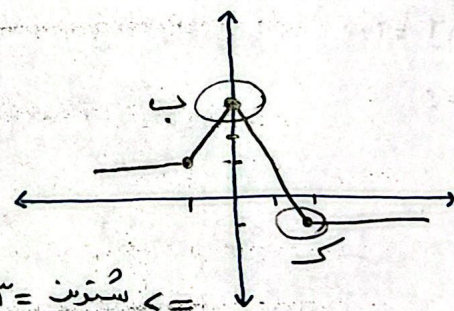
$$y = \underbrace{|x+1|}_{x=-1} - \underbrace{|2x|}_{x=0} + \underbrace{|x-2|}_{x=2}$$

$$\rightarrow -x-1+2x-x+2=1 \rightarrow x < -1$$

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

$$\rightarrow x+1-2x-x+2=-2x+3 \rightarrow 0 < x \leq 2$$

$$\rightarrow x+1-2x+x-2=-1 \rightarrow x > 2$$



$$x-1 = 2 \Rightarrow x = 3 \quad \begin{matrix} 3 = \text{بیشترین} \\ -1 = \text{کمترین} \end{matrix}$$

$$y = \left| \frac{1}{x} \right| - 2$$

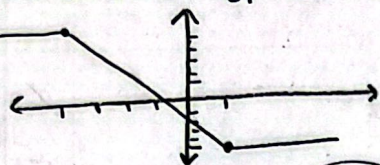
$$\hookrightarrow y' = \left| \frac{1}{x} \right| - 2 + 1 = \left| \frac{1}{x} \right| - 1$$

$$y = y' \Rightarrow \left| \frac{1}{x} \right| - 2 = \left| \frac{1}{x} \right| - 1$$

$$\left| \frac{1}{x} \right| = \left| \frac{1}{x} \right| + 1 \Rightarrow |x| = |x+1| + 1$$

$$\Rightarrow x = -3$$

الف) $f(x) = [|1-x| - |x+1|] \Rightarrow x=1 \text{ و } x=-1$



$\hookrightarrow R = [-a \leq y < a] \Rightarrow R = \{-a, -1, \dots, 1, a\}$

ب) $f(x) = \frac{1}{x} - \left(\frac{x+1}{1 + \frac{1}{x}} \right) = 1 + \frac{1}{x} - \left[\frac{1}{a} \right] \Rightarrow R = [1, 2]$
 $0 \leq y < 1$

الف) $y = [-2x] - 1 \quad x \in (-1, 1)$

$-1 < x \leq -\frac{1}{2} \Rightarrow [-2x] - 1 = 0$

$-\frac{1}{2} < x < 0 \Rightarrow [-2x] - 1 = -1$

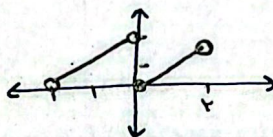
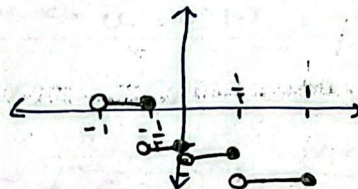
$0 < x \leq \frac{1}{2} \Rightarrow [-2x] - 1 = -2$

$\frac{1}{2} < x < 1 \Rightarrow [-2x] - 1 = -3$

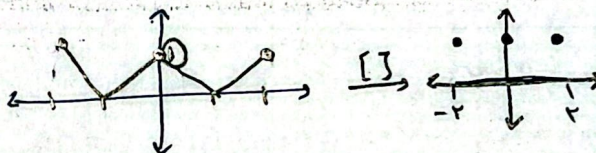
ب) $x \in (-2, 2) \Rightarrow x \in (-2, 2)$

$-2 < x < 0 \rightarrow x+2$

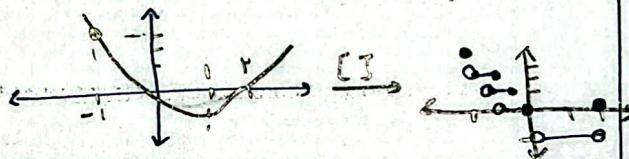
$0 \leq x < 2 \rightarrow x$



الف) $y = [|1x| - 1] \quad x \in [-2, 2]$



ب) $y = [x^2 - 2x] \quad x \in [-1, 2]$



$a + [b] = f, r \rightarrow a = 0, r \Rightarrow [a] + [b] = f$

$b - [a] = r, f \rightarrow [b] - [a] = r \Rightarrow b - 1 = r, f \Rightarrow b = r, f$

$a + b = ?$

$\Rightarrow \begin{cases} [a] + [b] = f \\ -[a] + [b] = r \end{cases}$

$\Rightarrow r[a] = r \Rightarrow [a] = 1 \Rightarrow a = 1, r$

$a + b = r, f$

$(1 + \sqrt{2})^4 + (1 - \sqrt{2})^4 = 191$

$(1 + \sqrt{2})^4 = ? \Rightarrow 191, \dots \Rightarrow [(1 + \sqrt{2})^4] = 191$

$(1 + \sqrt{2}) = -1 \leq x < 0$