

$$\frac{1}{x-1} \leq \pm (x-1) \quad D_f: x \neq 1$$

if  $x-1 > 0$ ,  $x > 1 \Rightarrow (x-1)^2 \geq 1$ ,  $x-1 \geq \pm 1 \Rightarrow x=0$  و  $x=2$   $\xrightarrow{D=(1,+\infty)}$   $x=2$   
 if  $x-1 < 0$ ,  $x < 1 \Rightarrow (x-1)^2 \leq 1$ ,  $x^2+1-2x \leq 1 \Rightarrow x^2-2x+2 \leq 0$ ,  $\Delta < 0$  ریشه ندارد  $\Rightarrow x=2$

الف)  $\left| \frac{x-1}{x} \right| < 2$  و  $D_f = \mathbb{R} - \{0\}$  /  $-2 < \frac{x-1}{x} < 2 \Rightarrow -2x < x-1 < 2x$

$-2x+1 < x$  و  $x > 1$ ,  $x > \frac{1}{3}$ ,  $2x < x+1 \Rightarrow \frac{1}{3} < x < +\infty$

ب)  $\left| \frac{x-2}{x+1} \right| > 1$ ,  $D_f = \mathbb{R} - \{-1\}$  /  $|x-2| > |x+1| \xrightarrow{\text{مربع کردن}}$   $(x-2)^2 > (x+1)^2$

$x^2+4-4x > x^2+1+2x$ ,  $3x^2+3x-3 < 0$ ,  $\Delta = 100$ ,  $x = -3, \frac{1}{3} \Rightarrow (-3, \frac{1}{3}) - \{-1\}$

$x^2 < |x+4|$

if  $x \geq 0$ ,  $x+4 \geq 0$ ,  $x \geq -4$  /  $x^2 < x+4$ ,  $x^2-x-4 < 0$ ,  $(x-3)(x+2) < 0 \Rightarrow -2 < x < 3$   
 if  $x < 0$ ,  $x+4 < 0$ ,  $x < -4$  /  $x^2 < -4-x \Rightarrow x^2+x+4 < 0$ ,  $\Delta < 0 \Rightarrow$  ریشه ندارد  $\Rightarrow x < -2$

میانگین  $= \frac{3+(-2)}{2} = \frac{1}{2} \Rightarrow$  اردوین تابعاً کمترین  $\rightarrow x - \frac{1}{2} < \frac{3-\frac{1}{2}}{\frac{1}{2}}$  و  $x - \frac{1}{2} > -2 - \frac{1}{2} \Rightarrow \left| x - \frac{1}{2} \right| < \frac{5}{2}$   
 $\left| \alpha = \frac{1}{2}, \beta = \frac{5}{2} \right|$

$y = |x+1| - |2x| + |x-2| \rightarrow x \in \{-1, 0, 2\}$

| x             | -1                                | 0                      | 2            |
|---------------|-----------------------------------|------------------------|--------------|
| $-x-1+2x+2-x$ | $x+1+2x+2-x$                      | $x+1-2x+2-x$           | $x+1-2x+x-2$ |
| 3             | $2x+3$                            | $-2x+3$                | -1           |
|               | if $x = -\frac{1}{2}$<br>$-1+3=2$ | if $x = 1$<br>$-2+3=1$ |              |

$\Rightarrow \min = -1, \max = 3$

بصورت  $3-1 \leq 2$

$y = \left| \frac{1}{x} \right| - 2 \xrightarrow{\text{مربع کردن}}$   $y = \left| \frac{1}{x} (x+4) \right| - 2 \xrightarrow{\text{مربع کردن}}$   $y = \left| \frac{1}{x} (x+4) \right| - 2 + 1 \Rightarrow y = \left| \frac{1}{x} x + 4 \right| - 1$

استرک  $\rightarrow \left| \frac{1}{x} x \right| - 2 \leq \left| \frac{1}{x} x + 4 \right| - 1 \rightarrow \left| \frac{1}{x} x \right| - \left| \frac{1}{x} x + 4 \right| \leq 1$   $\left| \frac{1}{x} x \right| \leq 0$ ,  $x \leq 0$  /  $\left| \frac{1}{x} x + 4 \right| \leq 0$ ,  $x \leq -4$

$-\frac{1}{x} + \frac{1}{x} x + 2 \leq \left| \frac{1}{x} x - \frac{1}{x} x - 2 \right| + 1 \Rightarrow x = -3$   
 $y = \left| \frac{1}{x} \right|$   $-x = 3$   $x = -3$   $-2 = 1$

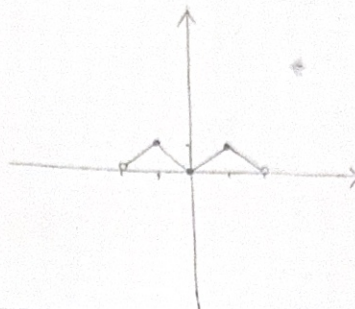
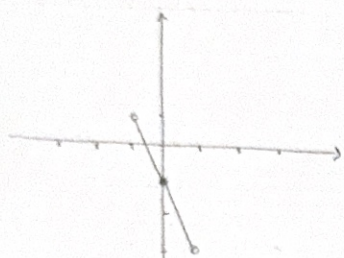
الف)  $f: [|1-x| - |x+4|]$   $|1-x| - |x+4| \in [-\infty, \infty]$

$\Rightarrow [|1-x| - |x+4|] \in \{-\infty, -5, -3, -1, 0, 1, 3, 5, \infty\}$

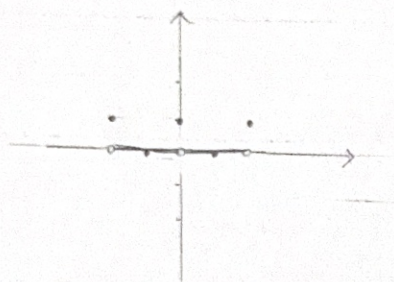
ب)  $f(x) = \frac{1}{x} - \left\lceil \frac{x+1}{x} \right\rceil$ ,  $D_f = \mathbb{R} - \{0\}$   $f(x) = \frac{1}{x} - \left\lceil 1 + \frac{1}{x} \right\rceil = \frac{1}{x} - \left\lceil \frac{1}{x} \right\rceil + 1$   
 $\mathbb{R} \setminus \{0\} \xrightarrow{+1} \mathbb{R} \setminus \{1\}$

الف)  $y = \lfloor 2x \rfloor - 1$   $x \in (-1, 1)$

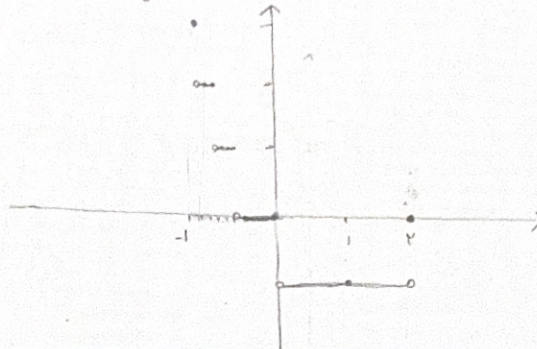
ب)  $y = x - 2 \left\lceil \frac{x}{2} \right\rceil$   $x \in (-2, 2)$



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



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



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

$[b] = 2 \Rightarrow b \in [2, 4]$ ,  $[b] - [a] = 2 \Rightarrow [a] = 0, a \in [0, 2]$

$a + b = 4, 2$

$(1 + \sqrt{2})^4 = 198 - (1 - \sqrt{2})^4 \rightarrow$  از طرف راستی بسازیم

$[(1 + \sqrt{2})^4] = [198 - (1 - \sqrt{2})^4] \xrightarrow{\text{در صندج خارج می کنیم}} [(1 + \sqrt{2})^4] = 198 - \underbrace{[(1 - \sqrt{2})^4]}_0 \Rightarrow [(1 + \sqrt{2})^4] = 198$

در نتیجه جزء صحیح عدد  $(1 + \sqrt{2})^4$  198 است