

$$D = \mathbb{R} \setminus \{1\} \quad x > 1 \rightarrow \frac{1}{x-1} = x-1 \rightarrow x^2 - 2x + 1 = 1 \rightarrow x = 0 \rightarrow x < 1 \quad \boxed{x=1} \text{ قی}$$

$$x < 1 \rightarrow \frac{1}{x-1} = 1-x \rightarrow -x^2 + 2x - 1 = 1 \rightarrow -x^2 + 2x - 2 = 0$$

$$\Delta = 4 - 8 = -4 < 0$$

ریشه حقیقی ندارد

$$x=1 \rightarrow \text{نقطهٔ ویژه}$$

$$1) -2 < \frac{x-1}{x} < 2 \rightarrow \frac{-2x-2x+1}{x} < 0 \rightarrow \frac{1}{x} < 0 \rightarrow x < 0 \rightarrow (-\infty, 0) \cup (\frac{1}{2}, +\infty)$$

$$x = \frac{1}{2} \rightarrow (-\frac{1}{2}, +\infty)$$

$$2) \left| \frac{x-1}{x+1} \right| > 1$$

$$x = -\frac{1}{2} \rightarrow (-\frac{1}{2}, \frac{1}{2}) \cup (-\frac{1}{2}, \frac{1}{2})$$

$$x^2 < |x+1| \rightarrow x+1 > x^2 \rightarrow x^2 - x - 1 < 0 \rightarrow x = \frac{1 \pm \sqrt{5}}{2}$$

$$x+1 < -x^2 \rightarrow x^2 + x + 1 < 0 \rightarrow x = \frac{-1 \pm \sqrt{3}}{2}$$

$$x = -\frac{1}{2} \rightarrow (-\frac{1}{2}, \frac{1}{2})$$

$$-3 < x < 3 \rightarrow |x| < 3$$

$$\alpha = 0$$

$$\beta = 3$$

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

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

$$y = |x+1| - |x-1| \rightarrow x = -1 \rightarrow x = 0 \rightarrow x = +1$$

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$$f(x) = [1-x] - [x+1]$$

$$1-x+x+1 = 2$$

-f

$$\begin{vmatrix} 1-x & x-1 \\ x-1 & -x-1 \end{vmatrix} = \begin{vmatrix} 1-x & x-1 \\ x-1 & -x-1 \end{vmatrix}$$

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

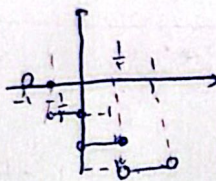
$$x = 1 \rightarrow y = -2$$

$$R = [-a, a] = \{0, 1, 2, 3, 4, 5, -1, -2, -3, -4, -5\}$$

$$\text{ب) } \frac{1}{x} - \left\lfloor \frac{x+1}{x} \right\rfloor = \frac{1}{x} - \left\lfloor \frac{x}{x} + \frac{1}{x} \right\rfloor = \frac{1}{x} - \left\lfloor \frac{1}{x} \right\rfloor - 1 \quad 0 \leq \frac{1}{x} - \left\lfloor \frac{1}{x} \right\rfloor < 1$$

$$-1 \leq \frac{1}{x} - \left\lfloor \frac{1}{x} \right\rfloor - 1 < 0 \quad \text{د. } = [-1, 0)$$

$$\text{الف) } -1 < x \leq -\frac{1}{2} \rightarrow y = 0 \quad -\frac{1}{2} < x \leq 0 \rightarrow y = -1 \quad 0 < x \leq \frac{1}{2} \rightarrow y = -2 \quad \frac{1}{2} < x < 1 \rightarrow y = -3$$

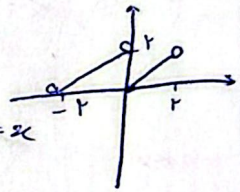


$$\text{ب) } y = x - 2 \left\lfloor \frac{x}{2} \right\rfloor$$

$$-1 < x < 0$$

$$y = x - 2 \left\lfloor \frac{x}{2} \right\rfloor = x + 2$$

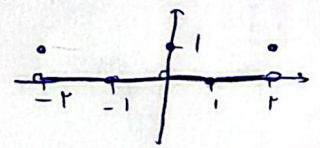
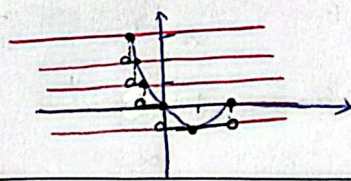
$$0 \leq x < 1 \rightarrow x - 2 \left\lfloor \frac{x}{2} \right\rfloor = x$$



$$\text{الف) } y = [1-x-1] \quad (-1, -1) \rightarrow |x| = -x \rightarrow [1-x-1] = [-x-1] = [-x] - 1 = 1 - 1 = 0$$

$$\begin{aligned} (-1, 0) &\rightarrow |x| = -x \rightarrow 1-x-1 = x \rightarrow [x+1] = [x] + 1 = -1 + 1 = 0 & x = -1 \rightarrow y = 0 \\ (0, 1) &\rightarrow |x| = 1-x \rightarrow [1-x] = [-x] + 1 = -1 + 1 = 0 & x = 0 \rightarrow y = 1 \\ (1, 2) &\rightarrow [x-1] = [x] - 1 = 1 - 1 = 0 & x = 1 \rightarrow y = 1 \end{aligned}$$

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



$$a = 0, 2$$

$$b = 0, 4$$

$$a + [b] = 2 \rightarrow [a] + [b] = 2$$

$$b - [a] = 4 \rightarrow [b] - [a] = 4$$

$$2[b] = 4 \rightarrow [b] = 2 \rightarrow b = 2 + 0, 1, 2, 3, 4$$

$$[a] = 1 \rightarrow a = 1 + 0, 1, 2$$

$$a + b = 2, 4$$

$$-1 < 1 - \sqrt{2} < 0 \quad 0 < (1 - \sqrt{2})^4 < 1 \quad (1 + \sqrt{2})^4 + (1 - \sqrt{2})^4 = 19$$

$$\rightarrow (1 + \sqrt{2})^4 = 19\sqrt{2}, \dots \rightarrow [(1 + \sqrt{2})^4] = 19\sqrt{2}$$