

$$\frac{1}{x-1} = |x-1| \quad \text{①}$$

$$\frac{1}{x-1} = 1-x$$

$$\frac{1}{x-1} = x-1$$

$$-x^2 + 2x - 2 = 0$$

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

یک طرفه دارد

$$x = 2$$

$$x(x-2) = 0$$

$$x = 2$$

غیر قابل قبول است

$$\text{الف) } \left| \frac{2x-1}{x} \right| < 2 \rightarrow |2x-1| < 2|x| \rightarrow (2x-1)^2 < 4x^2 \rightarrow 4x^2 + 1 - 4x < 4x^2$$

$$\rightarrow \text{مجموعه جواب} \rightarrow \left(\frac{1}{2}, +\infty \right)$$

$$\text{ب) } \left| \frac{x-2}{2x+1} \right| > 1 \rightarrow |x-2| > |2x+1| \rightarrow (x-2)^2 > (2x+1)^2 \rightarrow x^2 + 4 - 4x > 4x^2 + 4x + 1$$

$$\rightarrow 3x^2 + 8x - 3 < 0 \rightarrow x = -3, \frac{1}{3} \rightarrow x \neq -\frac{1}{2} \rightarrow (-3, -\frac{1}{2}) \cup (\frac{1}{3}, \frac{1}{2})$$

$$-3 < x < \frac{1}{3}, x \neq -\frac{1}{2}$$

$$x^2 < |x+4| \rightarrow |x-4| < 3$$

$$x+4 > x^2 \rightarrow x^2 - x - 4 < 0 \rightarrow x = 3, -2$$

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

$$-2 < x < 3 \rightarrow -\frac{1}{3} < x - \frac{1}{3} < \frac{1}{3} \rightarrow \left| x - \frac{1}{3} \right| < \frac{1}{3} \rightarrow \alpha = \frac{1}{3}$$

$$x < -1 \rightarrow y = -(x+1) + 2n - (x-2) = 1 \quad x = -1 \rightarrow y = -2 + 3 = 1$$

$$-1 < x < 0 \rightarrow y = (x+1) + 2n - (x-2) = 2n + 3 \quad x = 0 \rightarrow y = 4 + 2 = 2$$

$$0 < x < 2 \rightarrow y = (x+1) - 2n - (x-2) = -2n + 3 \quad x = 2 \rightarrow y = 3 - 2 = 1$$

$$x > 2 \rightarrow y = (x+1) - 2n + (x-2) = -1 \Rightarrow \text{man} + \text{min} = 3 - 1 = 2$$

$$y = \left| \frac{x}{r} \right| - r \rightarrow y = \left| \frac{x+\varepsilon}{r} \right| - r + 1 = \left| \frac{x+\varepsilon}{r} \right| - 1 \rightarrow \left| \frac{x}{r} \right| - r = \left| \frac{x+\varepsilon}{r} \right| - 1 \quad (5)$$

$$\left| \frac{x}{r} \right| = \left| \frac{x+\varepsilon}{r} \right| + 1 \rightarrow |x| = |x+\varepsilon| + 1$$

$$x \geq 0 \rightarrow x = x + \varepsilon + r \rightarrow \text{غلط} \rightarrow x \neq y$$

$$x < -\varepsilon \rightarrow -x = -(x + \varepsilon) + r \rightarrow 0 \neq r$$

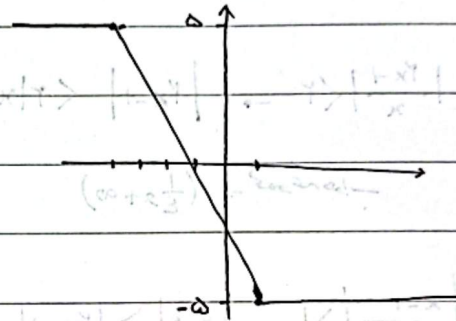
$$-\varepsilon < x < 0 \rightarrow -x = x + \varepsilon + r \rightarrow x = -3$$

حل برضورد

$$\text{الف) } f(x) = \left[|x+1| - |x+\varepsilon| \right]$$

$$\left| |x+1| - |x+\varepsilon| \right| \rightarrow \frac{-1}{-1} \rightarrow -1$$

$$\text{جواب در برآورد} \rightarrow R_{\text{min}} = \{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$$



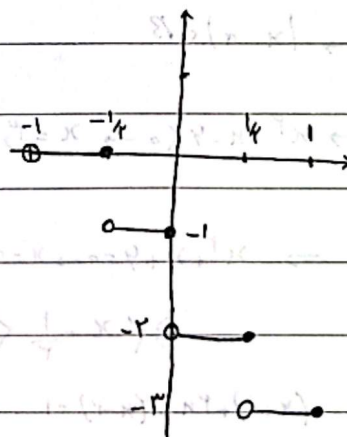
$$\text{ب) } f(x) = \frac{1}{x} - \left[\frac{n+1}{x} \right] \rightarrow \frac{1}{x} - \left[1 + \frac{1}{x} \right] \rightarrow \frac{1}{x} - \left[\frac{1}{x} \right] - 1 \rightarrow R_{\text{min}} = [-1, 0)$$

$$\text{الف) } y = \left[-rx \right] - 1 \quad x \in (-1, 1)$$

$$-2 < -rx < -1 \rightarrow -3 \quad 1 > x > \frac{1}{r}$$

$$-1 < -rx < 0 \rightarrow -2 \quad \frac{1}{r} > x > 0$$

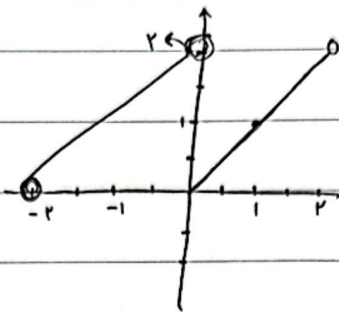
$$0 < -rx < 1 \rightarrow -1 \quad 0 > x > -\frac{1}{r}$$



ج) $y = x - 2 \left\lfloor \frac{x}{2} \right\rfloor \quad x \in (-2, 2)$

$-2 < x < 0 \rightarrow y = x - 2(-1) = x + 2$

$0 \leq x < 2 \rightarrow y = x - 2(0) = x$



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

$x = -2 \rightarrow y = 1$

$0 < x \leq 1 \rightarrow y = 0$

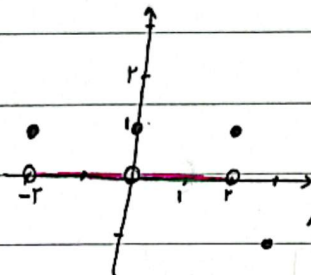
$-2 \leq x < -1 \rightarrow y = 0$

$1 \leq x < 2 \rightarrow y = 0$

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

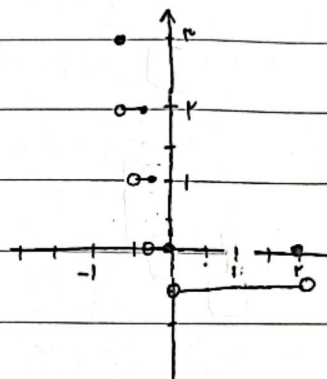
$x = 2 \Rightarrow y = 1$

$x = 0 \rightarrow y = 1$



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ب) $y = \lfloor nx - rn \rfloor, x \in [-1, 2]$



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$b - [a] = 2, 2$

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

$a + (b - 0, 2) = 2, 2$

$\rightarrow a + b = 1, 2 + 1, 2 = 2, 4$

$b - (a - 0, 2) = 2, 2$

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$(1 + \sqrt{2})^4 + (1 - \sqrt{2})^4 = 192$

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$(1 + \sqrt{2})^4 = 192 - (1 - \sqrt{2})^4 \rightarrow -1 < 1 - \sqrt{2} < 0 \rightarrow 0 < (1 - \sqrt{2})^4 < 1$

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$\lfloor (1 + \sqrt{2})^4 \rfloor = \lfloor 192 - 0, \dots \rfloor = 191$