

①

$$|x| = t \quad \begin{cases} t < 2 \rightarrow y \leq -\frac{1}{t} \\ t > 2 \rightarrow y > 1 \end{cases}$$

①

الف) $\frac{|x|+1}{|x|-2}$

$$\frac{t+1}{t-2} = 1 + \frac{3}{t-2} \rightarrow (-\infty, -\frac{1}{2}]$$

تقریب می شود

صفحه آخر...

ب) $y = \frac{x^2+1}{|x|} \rightarrow \frac{|x|^2+1}{|x|} = |x| + \frac{1}{|x|}$

$|x| > 0 \rightarrow R = [2, +\infty)$

②

②

$$y = x^2 + 2x - 2 \rightarrow y^2 + 4y = x^2 + 2x - 2$$

$$x^2 + (2-y)x - 2y - 2 = 0$$

$$\Delta = (2-y)^2 - 4(-2y-2) = y^2 + 4y + 12 \geq 0$$

$$R = (-\infty, -6] \cup [-2, +\infty)$$

$$+ \quad | \quad - \quad | \quad +$$

③

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$f(x) = \frac{x^2 - x + \frac{1}{x}}{x^2 - x + 1}$ $D = R$

چرا؟

$$\frac{(x - \frac{1}{x})^2}{(x - \frac{1}{x})^2 + \frac{3}{x}} \quad \frac{(x - \frac{1}{x})^2 = t}{t \geq 0} \rightarrow \frac{t}{t + \frac{3}{x}}$$

صفحه آخر...

$R_f = [0, 1)$

راه حل کامل

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$$\text{الف) } y = \sqrt{-x^2 + 2x - 1} \quad \frac{-b}{a} = 1 \rightarrow \sqrt{(-\infty, 1]}$$

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$$R = [0, \sqrt{3}]$$

$$\text{ب) } \sqrt{x^2 - 1} \quad \left| \frac{-b}{a} = 1 \right. \rightarrow \sqrt{[-1, +\infty)} = [-1, +\infty)$$

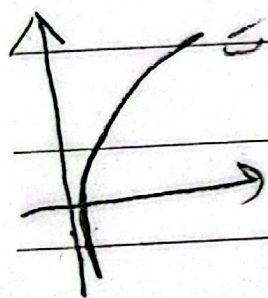
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$$\text{الف) } y = \log(x^2 - x + 1)$$

$$x^2 - x + 1 > 0$$

در این معادله، همیشه مثبت است

میشود که همیشه مثبت است $(-\infty, +\infty)$ می باشد $R = \mathbb{R}$ ✓



$$\text{ب) } y = \log\left(\frac{x^2 + 1}{x}\right) \rightarrow x + \frac{1}{x} \rightarrow x + \frac{1}{x} > 0$$

$$x + \frac{1}{x} > 0 \quad R = [1, +\infty)$$

$$|-2| \quad |0|$$

$$x = 1$$

$$x = 2$$

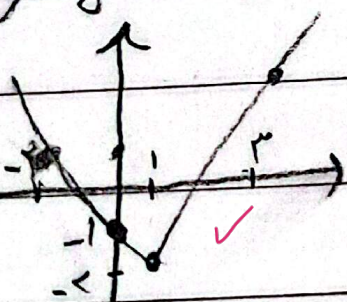
$$|3|$$

$$|4|$$

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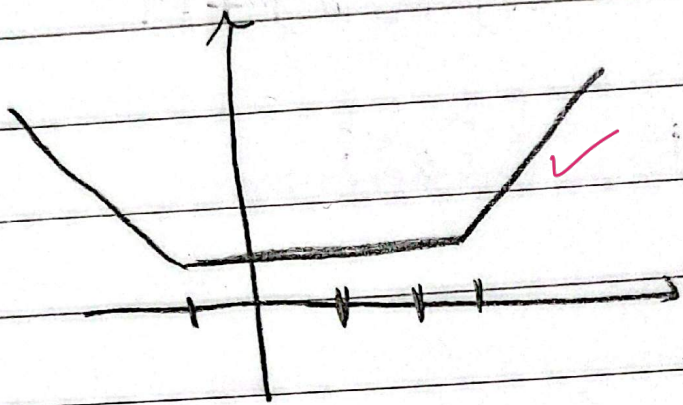
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$$\text{الف) } y = |2x - 2| - |x - 3|$$



$$R = [-2, +\infty)$$

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



$$R = [r, +\infty)$$

$$|x - r| - |x + 1| \leq 1$$

$$x < -1 \quad | \quad -1 \leq x \leq r \quad | \quad x > r$$

$$x + 1 \leq 1 \rightarrow x \leq 0$$

$$x \leq -r$$

$$-rx$$

$$-rx \leq 1$$

$$x \geq \frac{1}{r}$$

$$[\frac{1}{r}, r)$$

$$-x - 1$$

$$-x - 1 \leq 1 \rightarrow x \geq -2$$

$$x \geq r \rightarrow x \geq r \checkmark$$

$$R = (-\infty, -r] \cup [\frac{1}{r}, +\infty)$$

$$y = rx - |rx + 1| + |x|$$

$$x \leq -\frac{1}{r} \quad -\frac{1}{r} < x < 0 \quad 0 < x < \infty$$

$$|x + 1|$$

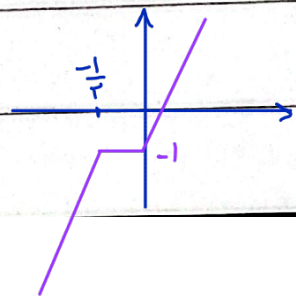
$$(-\infty, -\frac{1}{r})$$

$$-1$$

$$rx - 1$$

$$[-\frac{1}{r}, +\infty)$$

$$R = \mathbb{R}$$



Teacher

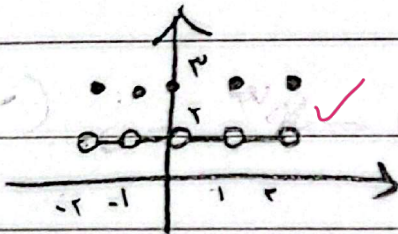
(2)

(9)

$$a) y = [x] + [x-2] \rightarrow [x] + [-x] + x$$

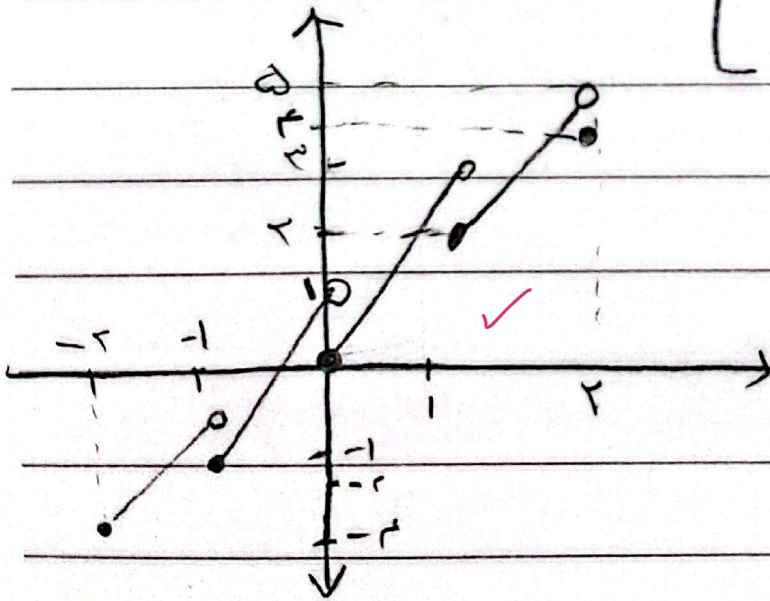
$$[x] + [-x] \begin{cases} x \in \mathbb{Z} & y = 0 \\ x \notin \mathbb{Z} & -1 \end{cases}$$

$$R = \{x, x\}$$



$$b) y = x - [x]$$

$$\begin{cases} -2 \leq x < -1 \rightarrow x+2 \\ -1 \leq x < 0 \rightarrow x+1 \\ 0 \leq x < 1 \rightarrow x \\ 1 \leq x < 2 \rightarrow x-1 \\ x=2 \rightarrow y=0 \end{cases}$$



$$[-2, 2]$$

$$a) y = \sin^2 x - \sin x + 1 \quad \begin{matrix} \sin x = 1 & y = 1 \\ \sin x = -1 & y = 1 \\ \sin x = \frac{1}{2} & y = \frac{3}{4} \\ \sin x = -\frac{1}{2} & y = \frac{3}{4} \end{matrix}$$

$$[\frac{3}{4}, 1]$$

$$b) y = \sin^2 x + \sin^2 x + 1 \quad \begin{matrix} \sin^2 x = 1 & y = 2 \\ \sin^2 x = \frac{1}{4} & y = \frac{5}{4} \\ \sin^2 x = 0 & y = 1 \end{matrix}$$

$$[1, 2]$$

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$$\square = |n| \rightarrow \begin{cases} |n| = 0 \rightarrow y = \frac{-1}{2} \\ |n| = +\infty \rightarrow y = 1 \end{cases} \xrightarrow[\text{محدوده}]{\text{مخرج میانه}} R_y = (-\infty, \frac{-1}{2}] \cup (1, +\infty)$$

$$f(n) = \frac{(n - \frac{1}{2})^2}{(n - \frac{1}{2})^2 + \frac{1}{4}}$$

۳- مخرج کسر همواره مثبت است پس دامنه IR است

$$\xrightarrow{\text{طرفین درمیان}} y n^2 - y n + y = n^2 - n + \frac{1}{4} \rightarrow (y-1)n^2 - (y-1)n + y - \frac{1}{4} = 0$$

$$n = \frac{y-1 \pm \sqrt{(y-1)^2 - 4(y-1)(y-\frac{1}{4})}}{2(y-1)} \rightarrow \Delta \geq 0 \rightarrow (y-1)(y-1-\cancel{4}y+1) \geq 0$$

$$\frac{0}{-} \mid \frac{1}{+} \Rightarrow y = [0, 1]$$

مخرج تمثیل صفر شود یعنی $y \neq 1$ است

و تابع در ازای هیچ مقداری برابر یک نیست پس برد برابر است با: $R_y = [0, 1)$

$$f(n) = \frac{\square^2}{\square^2 + \frac{1}{4}} \quad \text{می‌توانست از روش مربع هم استفاده کنیم}$$