

①

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

الف) $\frac{|x|+1}{|x|-r}$

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

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

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

⑤

$$y = \frac{x^2+r^2-r}{x} \rightarrow yx + ry = x^2 + r^2 - r$$

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

$$\Delta = (r-y)^2 - 4(-ry-r) = y^2 + 4y + 4r > 0$$

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

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

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

$$\frac{(x - \frac{1}{r})^2}{(x - \frac{1}{r})^2 + \frac{r}{r}} \xrightarrow{(x - \frac{1}{r})^2 = t} \frac{t^2}{t^2 + \frac{r}{r}}$$

$R_f = [0, 1)$

④

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

$$R = [0, 1]$$

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

⑤

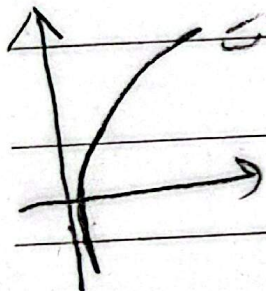
$$\text{الف) } y = \log(x^3 - x + 1)$$

$$x^3 - x + 1 > 0$$

دراد درجه سوم است، همه مقادیر

می آید (یا کمتر) $(-\infty, +\infty)$ می بینیم در برابر R

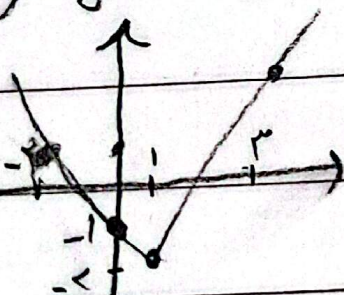
$$R = \mathbb{R}$$



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

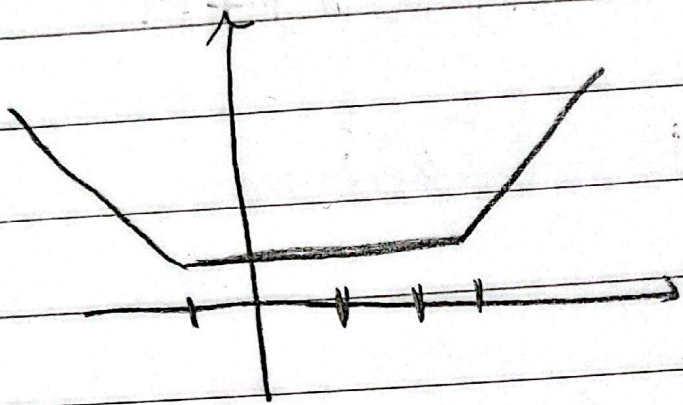
$$x + \frac{1}{x} > 0 \rightarrow R = [1, +\infty)$$

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



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

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



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

(V)

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

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

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

$$x \leq -r$$

$$-rx$$

$$-rx \leq 1$$

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

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

$$-x - r$$

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

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

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

(A)

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

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

$$rx + 1$$

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

$$-1$$

$$rx - 1$$

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

$$R = \mathbb{R}$$



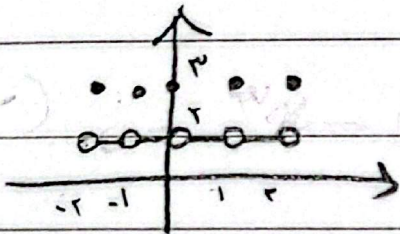
Teacher

(9)

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

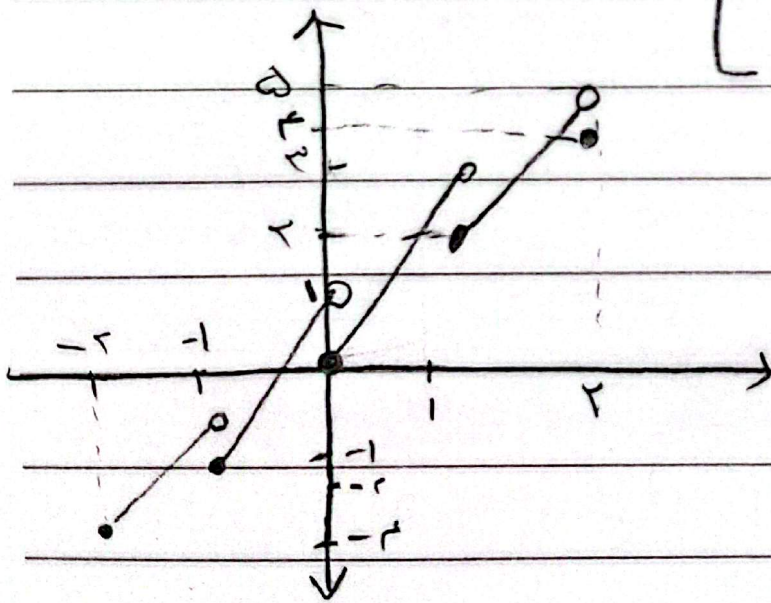
$$[x] + [-x] \begin{cases} x \in \mathbb{Z} & y = 0 \\ x \notin \mathbb{Z} & -1 \end{cases}$$

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



$$ب) y = x - [x]$$

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



$$[-2, 2]$$

(10)

$$الف) y = \sin^2 x - \sin x + 1 \quad \begin{matrix} \sin x = 1 & y = 1 \\ \sin x = -1 & y = 1 \\ \sin x = \frac{1}{2} & y = \frac{3}{4} \\ \sin x = -\frac{1}{2} & y = \frac{3}{4} \end{matrix} \quad \left[\frac{3}{4}, 1\right]$$

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

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