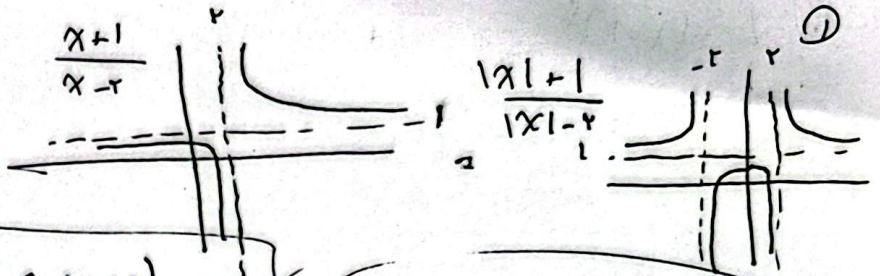


$$a) y = \frac{|x|+1}{|x|-2} \Rightarrow$$



$$\Rightarrow \left[-\infty, -\frac{1}{2}\right] \cup \left(\frac{1}{2}, +\infty\right) = \mathbb{R} \Rightarrow \mathbb{R} = \mathbb{R} - \left(-\frac{1}{2}, \frac{1}{2}\right)$$

$$\Rightarrow \frac{x^2+1}{|x|} = |x| + \frac{1}{|x|} \Rightarrow x + \frac{1}{x} \geq 2 \quad ; \quad x > 0 \Rightarrow |x| + \frac{1}{|x|} \geq 2$$

$$\Rightarrow \mathbb{R} = [2, +\infty)$$

$$\frac{x^2+2x-2}{x+2}$$

~~max(x)~~

~~min(x)~~

$$\hookrightarrow x + \frac{-2-x}{x+2} \rightarrow x-1 + \frac{1}{x+2}$$

~~$\mathbb{R} = \mathbb{R} \cup (-2, 2)$~~

$$\frac{(x+2)}{x} + \left(\frac{1}{x+2}\right) - 1 \quad \Rightarrow \quad t + \frac{1}{t} \quad t \in \mathbb{R} \Rightarrow$$

$$\left. \begin{aligned} 2 \leq t + \frac{1}{t} \\ t + \frac{1}{t} \leq -2 \end{aligned} \right\} \Rightarrow t + \frac{1}{t} - 2$$

$$\Rightarrow \mathbb{R} = \mathbb{R} \cup (-2, 2)$$

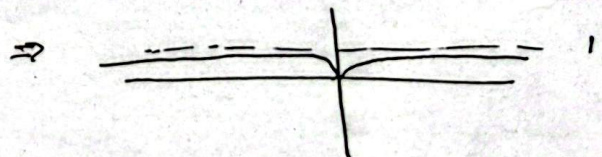
$$\left(x - \frac{1}{x}\right)^2$$

$$D_f = \mathbb{R}$$

$$x^2 - x + 1 \rightarrow \text{مشتق}$$

$$\Rightarrow 1 + \frac{2}{x} \times \frac{1}{x^2 - x + 1}$$

$$\frac{-b}{2a} = \frac{1}{2} \Rightarrow x^2 - x + 1 = \frac{1}{4}$$



$$\Rightarrow [0, 1] = \mathbb{R}$$

$$\begin{aligned} \text{max} & \rightarrow x = +\infty \\ \text{min} & \rightarrow x = \frac{1}{2} \Rightarrow 0 \end{aligned}$$

$$x = \frac{1}{2} + 1 = 1$$

$$\Rightarrow [0, 1] = \mathbb{R}$$

$$\text{a)} \sqrt{-(x-r)^2} \Rightarrow -(x-r)^2 \geq 0 \Rightarrow x=r \Rightarrow y=0$$

$$\Rightarrow R = \{0\}$$

⑦

$$\text{b)} \quad 2x^2 - 1x \Rightarrow \frac{-b}{2a} = \frac{1}{4} \Rightarrow \frac{-\Delta}{4a} = -1$$

$$\Rightarrow \sqrt{[-1; +\infty)}$$

$$\text{c)} \quad y = \log(x^3 - x + 1) \Rightarrow R = \mathbb{R}$$

⑧

$$\Rightarrow x^3 - x + 1 > 0 \quad \vee \quad (x^3 - x + 1) \in \mathbb{R}$$

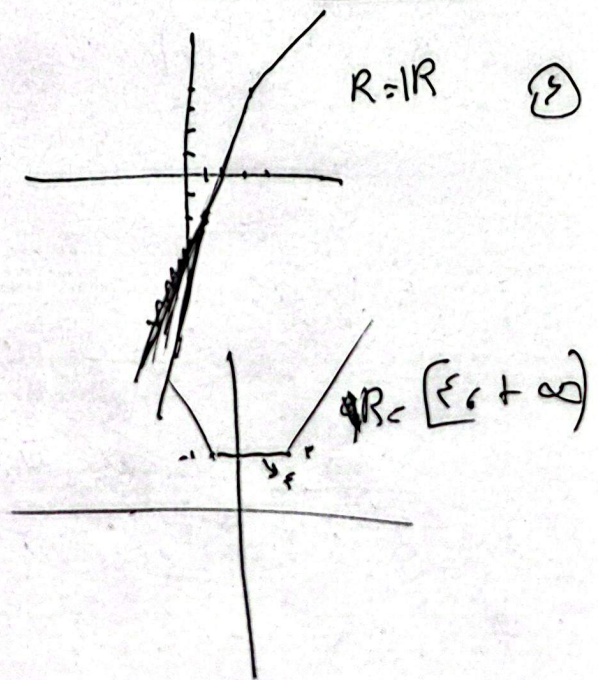
$$\text{d)} \quad \log_2\left(x + \frac{1}{x}\right) \Rightarrow$$

$$x + \frac{1}{x} > 0 \Rightarrow x > 0 \Rightarrow x + \frac{1}{x} \geq 2$$

$$\Rightarrow \log_2([2; +\infty)) = [1; +\infty) = \mathbb{R}$$

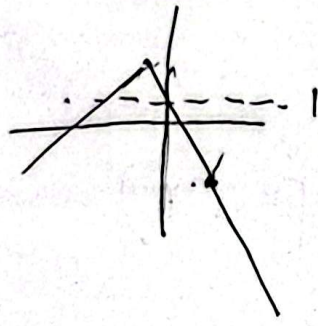
$$|2x-2| = |x-2|$$

$$y = |x-2| + |x-1|$$



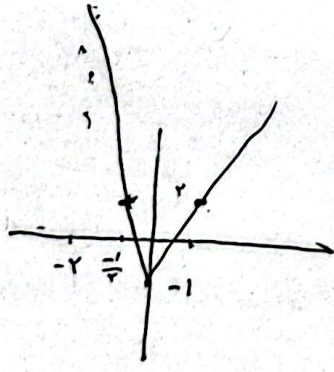
⑨

⑤



$$\begin{aligned}
 & -x + y - yx - y \leq 1 \\
 & -x + y + yx + y \leq 1 \\
 & -yx \leq 1 \Rightarrow x \geq -\frac{1}{y} \\
 & x \geq -\frac{1}{y} \\
 & \Rightarrow R = \left(-\frac{1}{y}, \infty \right)
 \end{aligned}$$

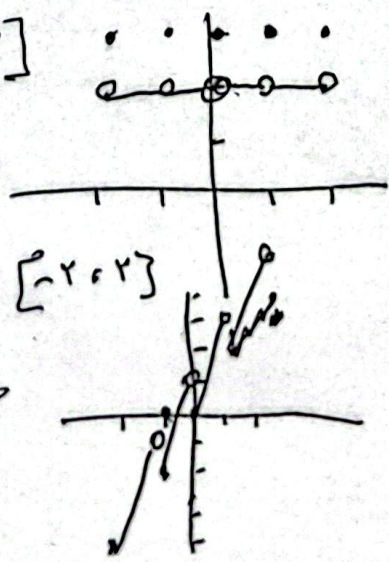
①



$$[-1, +\infty)$$

$$\begin{aligned}
 y + [x] + [-x] & \Rightarrow [-r, r] \\
 \Rightarrow R & = [-r, r]
 \end{aligned}$$

⑨



$$\begin{aligned}
 x - [x] & \begin{cases} yx : x \in \mathbb{Z} \\ yx - [x] : x \notin \mathbb{Z} \end{cases} \Rightarrow
 \end{aligned}$$

$$[-r, +\infty)$$

$$\sin \frac{\pi}{6} = \frac{1}{2}$$

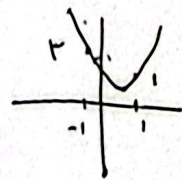
$$\Rightarrow \sin x = \frac{1}{2} \checkmark \Rightarrow \frac{\pi}{6}$$

(1)

$$-1 \leq \sin x \leq 1$$

$$1 \Rightarrow 1$$

$$\Rightarrow \left[\frac{\pi}{6}, \pi \right]$$



$$\therefore \sin^{-1} \frac{1}{2} = \frac{\pi}{6}$$

$$\Rightarrow \sin^{-1} x \rightarrow \begin{matrix} 0 \rightarrow 1 \\ 1 \rightarrow \pi \end{matrix}$$

$$[\pi, 2\pi]$$