

$$y|x| - 2y = |x| + 1 \rightarrow |x| \left(\frac{y}{y-1} \right) = \frac{1+2y}{y-1} \Rightarrow D_y = \frac{-\frac{1}{y}}{\frac{1}{y} - \frac{1}{y+1}} \checkmark$$

$$R_{f(x)} = (-\infty -\frac{1}{y}] \cup (1 \infty)$$

$$\frac{|x|^2 + 1}{|x|} = |x| + \frac{1}{|x|} \rightarrow a + \frac{1}{a} \rightarrow R_{f(x)} = [r \infty)$$

از این جا همواره مثبت است

$$x^2 + rx - r = yx + ry \rightarrow x^2 + (r-y)x - (r+ry) = 0 \rightarrow x_2 = \frac{-b \pm \sqrt{\Delta}}{2a}$$

$$\rightarrow x_2 = \frac{y+r \pm \sqrt{r^2 + y^2 - 2y + 1 + 4ry}}{2} \rightarrow \text{if } y^2 + 4y + 1 \geq 0 \rightarrow$$

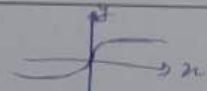
$$\rightarrow \frac{-y}{2} - \frac{r}{2} \rightarrow R_{f(x)} = (-\infty -\frac{r}{2}] \cup [-\frac{r}{2} \infty)$$

$$x^2 - x + 1 \neq 0 \rightarrow \Delta = -3 < 0 \rightarrow \text{همواره مثبت} \rightarrow R_{f(x)} = \mathbb{R}$$

$$x^2 - x + \frac{1}{x} = yx^2 - yx + y \rightarrow (1-y)x^2 - (1-y)x + (\frac{1}{x} - y) = 0$$

$$\rightarrow x_2 = \frac{1-y \pm \sqrt{1+y^2 - 2y + 1 - 4y}}{2(1-y)} \rightarrow \sqrt{-y^2 + 2y} \quad \frac{-\frac{1}{x}}{2} + \frac{y}{2}$$

$$, 1-y \neq 0 \rightarrow y \neq 1 \rightarrow R_{f(x)} = [0 \frac{y}{x}]$$

$R_{f(x)} = \mathbb{R}$  $\sqrt[3]{t}$ بردار

ext $\left| \frac{-b}{2a} \right|_{\text{ext}} \rightarrow y_{\text{ext}} = -\frac{1}{2} + 1 = \frac{1}{2} \rightarrow R_{(-x^2 + 4x - 1)} = (-\infty \frac{1}{2}] \rightarrow$ الف

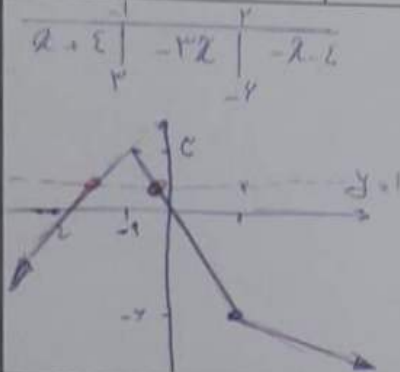
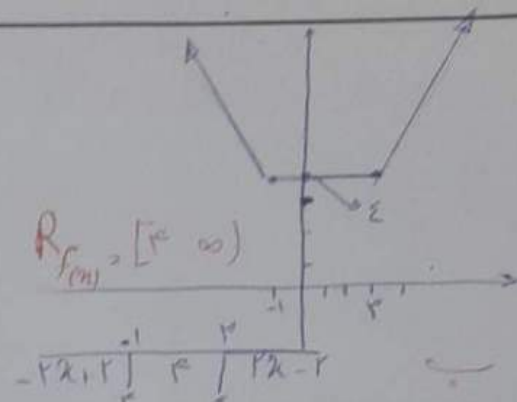
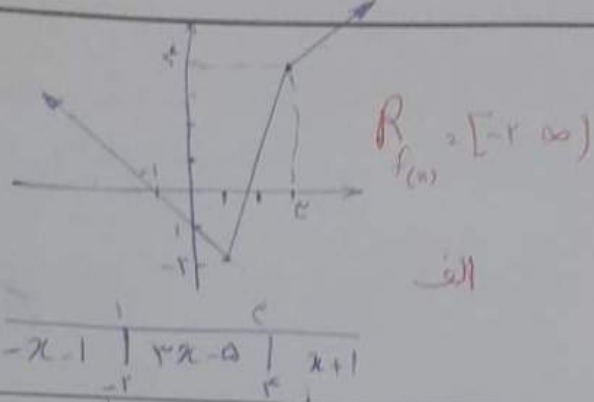
$$R_{(\sqrt{-x^2 + 4x - 1})} = R_{f(x)} = \sqrt{(-\infty \frac{1}{2}]} = [0 \sqrt{3}]$$

الف چون برد عبارت درون پرانتز $\mathbb{R}$ است (دلیل دایره) و برد رادیکال با دامنه $\mathbb{R}^+$ است $R_{f(x)} = \mathbb{R}$

$$\frac{x^2 + 1}{x} = x + \frac{1}{x} \rightarrow R_{(x + \frac{1}{x})} = (-\infty -1] \cup [1 \infty) \text{ و } D_{\log \frac{1}{x}} = \mathbb{R}^+ \rightarrow$$

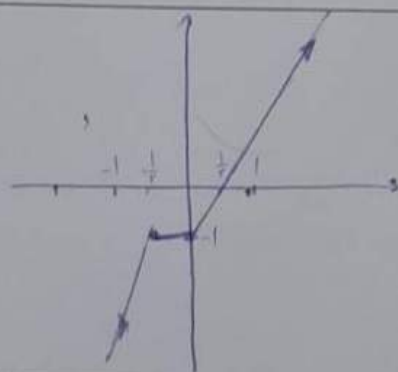
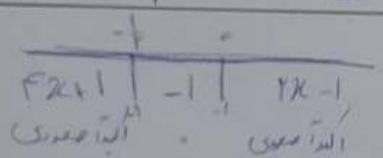
$$\log_r t \quad f(x) = \log_r [r \infty) \Rightarrow R_{f(x)} = [1 \infty)$$

$\log_r t \mid t \in [r \infty)$

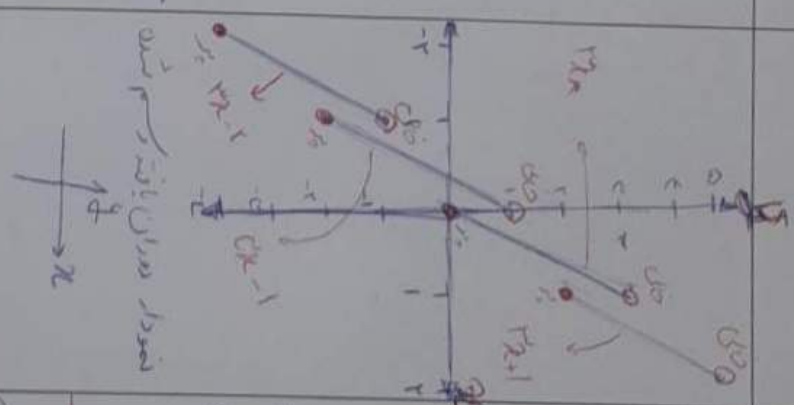
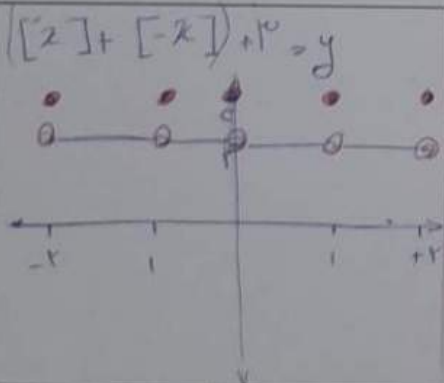


$$\begin{aligned} x + c = 1 &\rightarrow x = 1 - c \\ -cx = 1 &\rightarrow x = -\frac{1}{c} \end{aligned} \Rightarrow$$

$$x \in (-\infty, -1] \cup [-\frac{1}{c}, \infty)$$



$$R_{f(x)} = \mathbb{R}$$



الف

$$\begin{aligned} \sin x = 1 & \quad 1 + 1 + 1 = 1 \\ \sin x = -1 & \quad 1 + 1 + 1 = 3 \\ \sin x = \frac{1}{2} & \quad \frac{1}{2} - \frac{1}{2} + 1 = \frac{1}{2} \end{aligned}$$

$$R_{f(x)} = [\frac{1}{2}, 1]$$

ب

$$\begin{aligned} \sin x = 1 & \quad 1 + 1 + 1 = 3 \\ \sin x = -1 & \quad 1 + 1 + 1 = 3 \\ \sin x = \frac{1}{2} & \quad \frac{1}{4} + \frac{1}{2} + 1 = 1 \frac{3}{4} = \frac{7}{4} \end{aligned}$$

$$R_{f(x)} = [\frac{7}{4}, 3]$$