

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

$$\Rightarrow \Delta \geq 0 \Rightarrow (1 - y)^2 - 4(y + 1) = 1 + y^2 + 2y - 4y - 4 = y^2 - 2y - 3 \Rightarrow (y - 3)(y + 1)$$

$$\frac{-1}{+1} - \frac{3}{-1} + \Rightarrow R_f = (-\infty, -1] \cup [3, +\infty) \checkmark$$

$$\text{الف)} -\frac{b}{1a} = \frac{5}{4} \Rightarrow y = 2\left(\frac{15}{14}\right) - \frac{2 \cdot 5}{4} + 1 \Rightarrow \frac{15 - 5 + 1}{1} = \frac{-1}{1} \Rightarrow \text{گراف} \Rightarrow R_f = \left[-\frac{1}{1}, +\infty\right)$$

$$\text{ب)} -x^2 + 4x - 5 \Rightarrow -\frac{b}{1a} = 2 \Rightarrow y = -4 + 16 - 5 = 7 \Rightarrow R = (-\infty, 7] \Rightarrow [0, 7] \leftarrow R_f$$

$$\text{ج)} \xrightarrow{\text{حد اشد اول}} R_f = \sqrt{(-\infty, +\infty)} = [0, +\infty) \checkmark$$

$$\text{د)} \xrightarrow{\text{حد اشد اول}} R_f = (0, +\infty) \Rightarrow R_f = \mathbb{R} \checkmark$$

$$\text{الف)} R_f = \mathbb{R} - \left\{\frac{a}{c}\right\} \Rightarrow R_f = \mathbb{R} - \left\{\frac{3}{4}\right\} \checkmark$$

$$\text{ب)} R_f = \sqrt{\mathbb{R}} - \left\{\frac{a}{c}\right\} \Rightarrow R_f = [0, +\infty) - \left\{\frac{3}{4}\right\} \checkmark$$

$$\text{ج)} x_{\min}^2 = 0, x_{\max}^2 = +\infty \Rightarrow R_f = \left[\frac{f}{\sqrt{f}}, +\infty\right) \checkmark$$

$$\text{د)} x^2 + 3 + \frac{1}{x^2 + 3} - 15 \Rightarrow \frac{x^2 + 3}{a} + \frac{1}{\frac{1}{x^2 + 3}} - 15 \Rightarrow \frac{a + \frac{1}{a}}{a} - 15 \Rightarrow R_f = [-1, +\infty) \checkmark$$

$$\text{الف)} yx^2 - y = 3x^2 + 15 \Rightarrow 3x^2 - yx^2 = -y - 15 \Rightarrow x^2 = \frac{y + 15}{y - 3} \Rightarrow x = \sqrt{\frac{y + 15}{y - 3}}$$

$$\Rightarrow \frac{y + 15}{y - 3} \geq 0 \Rightarrow \frac{-15}{+1} - \frac{3}{-1} + \Rightarrow R_f = (-\infty, -15] \cup (3, +\infty) \checkmark$$

$$\text{ب)} \min x^2 = 0, \max x^2 = +\infty \Rightarrow x^2 = 0 \Rightarrow -15, x^2 = +\infty \Rightarrow 3 \Rightarrow R_f = (-\infty, -15] \cup (3, +\infty) \checkmark$$

$$\text{الف)} 3y + 1 = 4 \sin x - y \sin x \Rightarrow \sin x = \frac{3y + 1}{1 - y} \Rightarrow -1 \leq \frac{3y + 1}{1 - y} \leq 1 \Rightarrow \frac{3y + 1}{1 - y} \leq 1 \Rightarrow \frac{3y + 1}{1 - y} \leq 1$$

$$\text{ب)} \min \sin x = -1, \max \sin x = 1 \Rightarrow -1 = \frac{3y + 1}{1 - y} = -\frac{3}{1} \Rightarrow 1 = \frac{3y + 1}{1 - y} = \frac{1}{1} \Rightarrow R_f = \left[-\frac{3}{1}, \frac{1}{1}\right] \checkmark$$

$$D(f) \Rightarrow \text{معرّف} \neq \emptyset \Rightarrow \Delta \text{ منتهی} \neq \emptyset \Rightarrow Df = \mathbb{R}$$

①
1.5

$$\frac{(x - \frac{1}{p})^p}{(x - \frac{1}{p})^p + \frac{1}{p}} \Rightarrow (x - \frac{1}{p})_{\min} = 0 \Rightarrow (x - \frac{1}{p})_{\max} = +\infty$$

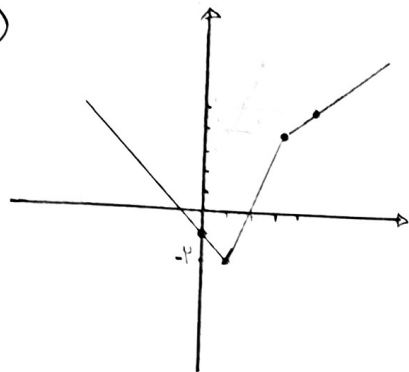
$$\Rightarrow R_f = [0, +\infty)$$

$$f(\infty) = 1$$

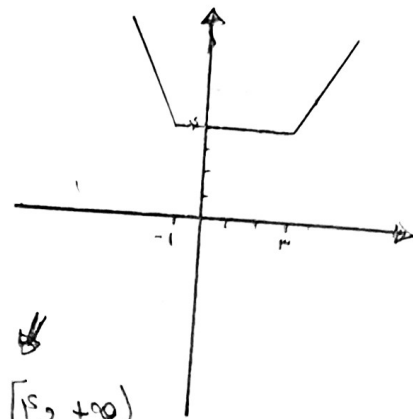
$$R_f = [0, 1)$$

مخرج محدود از صورت غیر نسبت

الف)

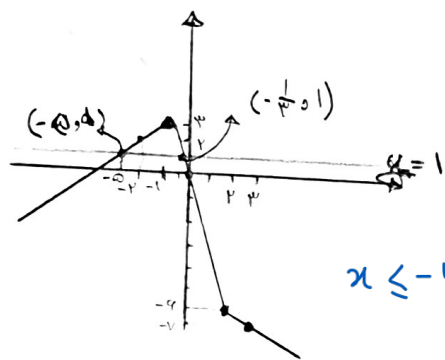


$$\Rightarrow R_f = [-1, +\infty)$$



$$R_f = [1, +\infty)$$

⑦
2

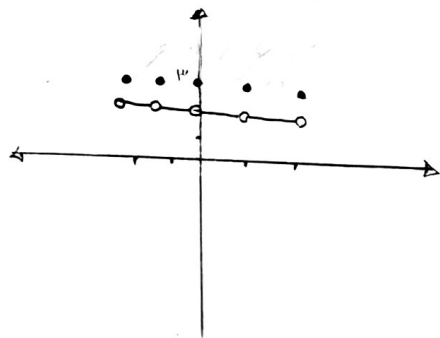


$$\Rightarrow \text{جواب} = \mathbb{R} - (-\frac{1}{2}, \frac{1}{2})$$

$$x \leq -1 \quad x + 2 \leq 1 \quad x \leq -3$$

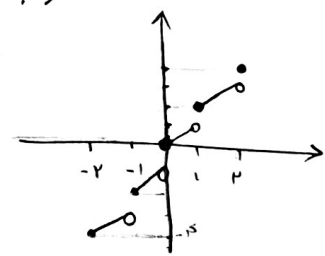
①.18 ①

الف) $y = [x] + [-x] + 3 \rightarrow$ نمودار $x + [-x]$ واحد به سمت بالا



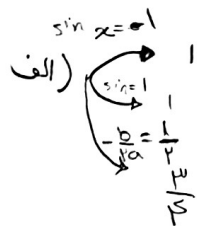
$$\Rightarrow R_f = \{3, 2\}$$

ب)



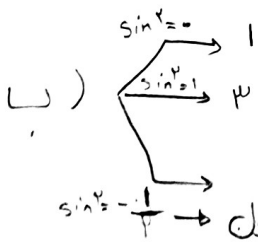
$$R_f = [-1, 4]$$

1.28 ⑨



$$\Rightarrow R_f = [\frac{3}{4}, 1]$$

⑤ ⑩



$$\Rightarrow R_f = [1, 3]$$

فترت قبل