

$$y = (x - r \left[\frac{x}{r} \right])^r \rightarrow y = \left(r \left(\frac{x}{r} - \left[\frac{x}{r} \right] \right) \right)^r \rightarrow$$

سؤال (۱)
(۲)

$$\Rightarrow Rf = [0, r]$$

$$0 - [0]$$

$$[0, 1) \sim r[0, 1) = [0, r)$$

$$y = -\sin x + \log y - \epsilon = 0 \rightarrow \log y = \sin x + r \rightarrow y = 1. \sin x + r$$

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

$$\rightarrow 1. r \leq y \leq 1. \omega \rightarrow Rf = [1. r, 1. \omega]$$

$$f(x) = \sqrt{\frac{x^2 - r}{x^2 - 9}}$$

$$[a, b] \cup (c, +\infty) \quad a + b + c = ?$$

سؤال (۲)

(۲)

$$y = \frac{x^2 - r}{x^2 - 9} \rightarrow yx^2 - 9y = x^2 - r \rightarrow x = \pm \sqrt{\frac{9y - r}{y - 1}}$$

$$\frac{9y - r}{y - 1} \geq 0 \rightarrow y = \frac{r}{9}$$

$$\begin{array}{c} \frac{r}{9} \\ | \\ + \quad - \quad + \\ \hline \end{array} \rightarrow (-\infty, \frac{r}{9}] \cup (1, +\infty)$$

$$Rf = \sqrt{(0, \frac{r}{9}] \cup (1, +\infty)} \Rightarrow Rf = (0, \frac{r}{r}) \cup (1, +\infty)$$

$$a + b + c = 0 + \frac{r}{r} + 1 = \frac{\omega}{r}$$

$$f(x) = x + \frac{1}{x} + r \sqrt{x + \frac{1}{x}}$$

$$x + \frac{1}{x} \geq 0 \Rightarrow \frac{x^2 + 1}{x} \geq 0 \rightarrow x^2 = -1 \text{ غلط}$$

سؤال (۳)
(۱, ۵)

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

$$\text{if } x > 0 \Rightarrow x + \frac{1}{x} \geq r \rightarrow [r, +\infty) \quad f(\min) = f(1) = r + r\sqrt{r}$$

$$Rf = [r + r\sqrt{r}, +\infty)$$

$$x + \frac{1}{x} = A \Rightarrow f(x) = A + r\sqrt{A} \Rightarrow (\sqrt{A} + 1)^2 - 1 \Rightarrow \sqrt{A} + 1 > 0 \rightarrow (\sqrt{A} + 1) - 1 > -1$$

$$y = (r - \sin x)(1 + \sin x) \rightarrow y = -\sin^2 x + r \sin x + r$$

$$\Rightarrow \begin{cases} \sin x = 1 \rightarrow y = f \text{ max} \\ \sin x = -1 \rightarrow y = 0 \text{ min} \\ \sin x = -\frac{b}{2a} = y = f \end{cases}$$

$$Rf = [0, r]$$

پاورس تری

$$f(x) = -\frac{1}{x}x + 1. \quad -\frac{9}{2} + 1 = -\frac{7}{2}$$

$$D_f = \{1, 2, 3, 4, 5, 6, 7, 8, 9\} \rightarrow \text{جوابی}$$

$$R_f = \left\{ \frac{9}{1}, \frac{8}{2}, 1, \frac{4}{3}, \frac{5}{4}, 1, \frac{3}{5}, \frac{2}{6}, 1 \right\}$$

$$S = \frac{\left(\frac{9}{1} + \frac{9}{1}\right) \times 9}{2} = \frac{162}{2} = 81$$

$$f(x) = \sqrt{ax^2 + bx + c} \quad f(3) = 1 \rightarrow \sqrt{9a + 3b + c} = 1 \Rightarrow 9a + 3b + c = 1 \quad \text{سوال 5}$$

$$g(x) = \sqrt{bx^2 + ax + c} \quad R_f = ? \quad ax^2 + bx + c \geq 0 \quad \left\{ \begin{array}{l} a = 0 \rightarrow 3b + c = 1 \quad \text{I} \\ 3b + c = 1 \\ 3b + c = 0 \end{array} \right.$$

$$D_f = [3, +\infty) \Rightarrow x^2 \text{ ... } \Rightarrow a = 0$$

$$f(3) = 0 \Rightarrow \sqrt{3b + c} = 0 \Rightarrow 3b + c = 0 \quad \text{II}$$

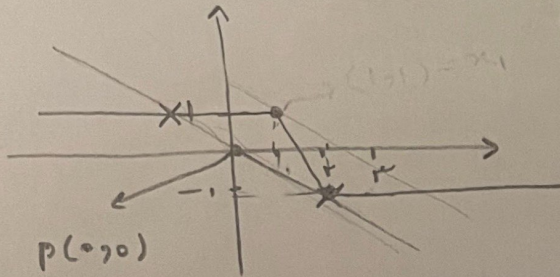
$$\left\{ \begin{array}{l} 3b + c = 1 \\ 3b + c = 0 \\ c = -3 \quad b = 1 \end{array} \right.$$

$$g(x) = \sqrt{x^2 + 3} \Rightarrow x^2 + 3 \rightarrow x_{\min} = -\frac{b}{2a} = 0 \Rightarrow \sqrt{[3, +\infty)}$$

$$\Rightarrow R_g = [3, +\infty)$$

$$|x-2| - |x-1| = kx \quad \left\{ \begin{array}{ll} x < 1 & \\ f(x) = -2x + 3 & 1 \leq x \leq 2 \\ -1 & x > 2 \end{array} \right.$$

$$|0| \quad |1| \quad |2| \quad |3| \quad \text{سوال 4}$$



$$\begin{aligned} \text{نقطه 1} (0, 0) &\Rightarrow y = kx \Rightarrow k = -\frac{1}{2} \\ \text{نقطه 2} (2, -1) & \\ \text{نقطه 3} (3, -1) & \end{aligned}$$

$$\text{الف) } y = x[x] \quad [-2, 2]$$

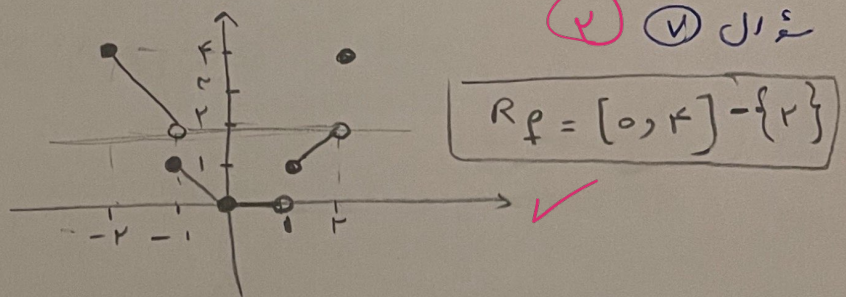
$$-2 \leq x < -1 \rightarrow y = -2x$$

$$-1 \leq x < 0 \rightarrow y = -x$$

$$0 \leq x < 1 \rightarrow y = 0$$

$$1 \leq x < 2 \rightarrow y = x$$

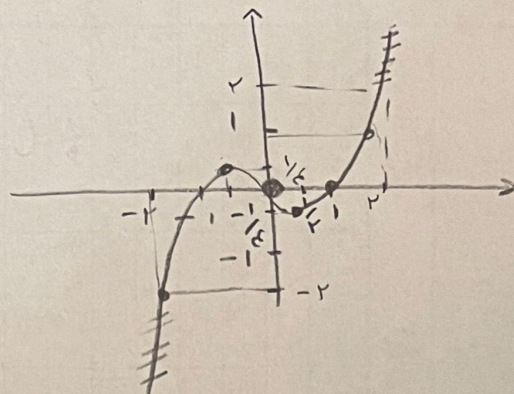
$$x = 2 \rightarrow y = 2$$



$$R_f = [0, 2] - \{2\}$$

آداب سوال (۷)

$$y = x|x| - x \begin{cases} x^2 - x & 0 < x \leq 1 \\ -x^2 - x & -1 \leq x < 0 \end{cases}$$



$$R_f = [-1, 1] \checkmark$$

$$y = \frac{1}{x} + \frac{1}{x+1} + \frac{1}{x^2+x} = \frac{x+1+x+1}{x(x+1)}$$

سوال (۸)

$$R_f = R - \{a, b\}$$

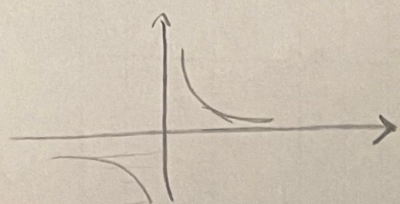
$$a+b=?$$

$$x \neq 0$$

$$x \neq -1 \rightarrow y = -1$$

$$R - \{-1, 0\}$$

$$a+b = 0 - 1 = -1 \checkmark$$



$$f(x) = \frac{x - 2\sqrt{x} + 1}{x - 2\sqrt{x} + 1} \quad x \geq 0$$

مقدار $x=0$ است
در نتیجه $+\infty$

سوال (۹)

$$\begin{aligned} x \rightarrow 0 & \rightarrow \frac{1}{1} = 1 \\ x \rightarrow +\infty & \rightarrow \frac{x - 2\sqrt{x}}{x - 2\sqrt{x}} = 1 \end{aligned}$$

الخرج ضویر

$$x - 2\sqrt{x} + 1 = 0$$

$$\sqrt{x} = t \Rightarrow t^2 - 2t + 1 = 0$$

$$(t-1)(t-1) = 0 \Rightarrow t = 1$$

$$\sqrt{x} = 1 \Rightarrow x = 1$$

$$R_f = (-\infty, 1) \cup [1, +\infty)$$

$$f(x) = \frac{x^3 + 2x^2 - x - 2}{x^2 - 1} = \frac{(x^2 - 1)(x + 2)}{(x^2 - 1)} = x + 2 \Rightarrow R_f = R$$

سوال (۱۰)

دک

$$x^2 - 1 = 0$$

$$\Rightarrow x^2 = 1 \Rightarrow x = \pm 1$$

در این نقطه تعریف نشده است

$$\begin{aligned} x=1 & \rightarrow y=3 \\ x=-1 & \rightarrow y=1 \end{aligned}$$

$$\Rightarrow 1 + 3 = 4$$

مجموع ۲ عدد

$$\begin{array}{r} x^3 + 2x^2 - x - 2 \\ x^3 - x \\ \hline 2x^2 - x - 2 \\ 2x^2 - x \\ \hline -2 \end{array}$$