

$$f(u) = \sqrt{u + \varepsilon} \sqrt{u - \varepsilon} \quad g(u) = \sqrt{u - \varepsilon} \sqrt{u - \varepsilon} \quad t = \sqrt{u - \varepsilon} \quad u = t^2 + \varepsilon$$

$$= \sqrt{t^2 + \varepsilon + \varepsilon t} = \sqrt{t^2 + \varepsilon - \varepsilon t} \quad u \geq 1 \wedge t \geq 2$$

$$\sqrt{(t + \varepsilon)^2} = t + \varepsilon \quad \sqrt{(t - \varepsilon)^2} = t - \varepsilon$$

$$f(u) + g(u) = t + \varepsilon + t - \varepsilon = 2t = 2\sqrt{u - \varepsilon}$$

$$a + b\sqrt{u + c} \rightarrow a = 0 \quad b = 2 \quad c = -\varepsilon \rightarrow \frac{0 + 2}{-1} = \boxed{\frac{1}{2}} = \frac{a + b}{c}$$

$$f(x) = \frac{x}{x - 1 + \mu} = -x \quad \frac{g}{f} = -\frac{1}{\varepsilon} \quad f(1) = \frac{0}{0} = 0 \quad \frac{g}{f} = \text{تعریف نشده}$$

$$f(x) = \frac{a}{4 - 12 + \mu} = \frac{a}{0} \quad \text{تعریف نشده} \quad \frac{\mu}{1 - 12 + \mu} = \text{تعریف نشده}$$

$$f(0) = \frac{x}{\mu} \quad \frac{x}{\frac{x}{\mu}} = \boxed{4}$$

$$\frac{g}{f} = \left\{ \left(2, -\frac{1}{\varepsilon} \right), (0, 4) \right\}$$

$$f(\mu x) = \frac{1}{x} \text{ و } \frac{\mu}{x} \text{ و } \frac{x}{\mu} \text{ و } -\frac{1}{x} \rightarrow \left\{ \left(\frac{1}{x} + 2 \right), \left(\frac{\mu}{x} - 1 \right), (2, 2), \left(-\frac{1}{x} + 4 \right) \right\}$$

$$\left\{ \begin{aligned} 2g^2(u) + 1 &= \varepsilon(-2, 9) \text{ و } (1, 3) \text{ و } (2, 9) \text{ و } (-1, 1) \\ 2(g(u))^2 + 1 &= 14 \text{ و } 3 \text{ و } 4 \text{ و } 1 \end{aligned} \right\}$$

$$f(x^2) = 1, 3, 4 \rightarrow \pm\sqrt{1}, \pm\sqrt{3}, \pm\sqrt{4}$$

$$\left\{ (1, 2), (-1, 2), (\sqrt{3}, -1), (-\sqrt{3}, -1), (2, 2), (-2, 2) \right\}$$

$$\frac{2f}{g} \rightarrow \frac{2}{-1} = -2 \quad \frac{f(u)}{g} = \frac{1}{0} = \infty$$

$$\frac{2f}{g} = \left\{ (1, -1), (3, -2) \right\}$$

$$h = 2f + g$$

$$\text{دامنه: } 2 \text{ و } -2 \text{ و } 3$$

$$2 \rightarrow h = 2f(2) + g(2) = 2 + 3 = 5$$

$$h = \left\{ (2, 5), (-2, 4), (3, 5) \right\}$$

$$-2 \rightarrow h = 2f(-2) + g(-2) = 0 + 4 = 4$$

$$3 \rightarrow h = 2f(3) + g(3) = 2 + 3 = 5$$

$$f(u) = \frac{\sqrt{4u} - u}{u - 4}$$

$$g(u) = [u] + [-u]$$

$$u \geq 0 \quad u \geq 0$$

$$u \in \mathbb{Z} \rightarrow [u] + [-u] = 0$$

$$\sqrt{4u} - u \geq 0$$

$$u \notin \mathbb{Z} \rightarrow [u] + [-u] = -1 \quad \text{مخرج تعریف نمی شود}$$

$$u \geq u^2$$

$$\boxed{\text{دامنه} = \{0, 1, 3\}}$$

$$u(4 - u) \geq 0$$

$$0 \leq u \leq 4$$

$$u = 4$$

$$h(x) = \frac{f(x)}{g(x)}$$

$$x=1 \quad f(1) = \sqrt{10-1-1} = 0$$

$$h(1) = \frac{0}{1} = 0$$

$$x=2$$

$$f(2) = \sqrt{10-4-2} = \sqrt{4}$$

$$h(2) = \frac{\sqrt{4}}{2}$$

$$x=4 \quad f(4) = \sqrt{10-16-4} = 0$$

$$h(4) = \frac{0}{4} = 0$$

$$x=10 \quad f(10) = \sqrt{10-20-10} = \sqrt{-20} \quad \alpha$$

$$h = \left\{ (1,0), \left(2, \frac{\sqrt{4}}{2}\right), (4,0) \right\}$$

$$\text{الف) } y = (x-1)^3 + 1$$

که می توانیم در یادداشت

$$R_f = \mathbb{R}$$

$$\text{ب) } y = \frac{1}{x^2 - 2x}$$

$$y(x^2 - 2x) = 1$$

$$yx^2 - 2xy - 1 = 0$$

$$\Delta \geq 0$$

$$(-2y)^2 - 4(y)(-1) \geq 0$$

$$4y^2 + 4y \geq 0 \quad 4y(y+1) \geq 0$$

$$\begin{array}{c} -1 \quad 0 \\ + \quad - \quad + \\ \hline + \quad - \quad + \end{array}$$

صن نسبی

$$R_f = (-\infty, -1] \cup (0, +\infty)$$

$$\text{الف) } y = x^2 - 2x + 10$$

$$x_{\min} = \frac{1}{2} = 0.5$$

$$y_{\min} = 1 - 1 + 10 = 10$$

$$R_f = [10, +\infty)$$

$$\text{ب) } y = -x^2 + 4x + 3$$

$$x_{\max} = \frac{4}{2} = 2$$

$$y_{\max} = -4 + 8 + 3 = 7$$

$$R_f = (-\infty, 7]$$

$$\text{ج) } y = \sqrt{x^2 - 4x - 3}$$

$$x_{\min} = \frac{1}{2} = 0.5$$

$$y_{\min} = 1 - 2 - 3 = -4$$

$$R_f = [-4, +\infty)$$

$$\text{د) } y = \sqrt{-x^2 + 4x}$$

$$x_{\max} = \frac{4}{2} = 2$$

$$y_{\max} = -4 + 4 = 0$$

$$R_f = [0, 2]$$

بزرگترین توان فرد

$$R_f = \mathbb{R}$$

بزرگترین توان فرد

$$R_f = \mathbb{R}$$

ج)

$$R_f = \sqrt{1, \mathbb{R}}$$

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

توان دو دار و حتی

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

$$\text{الف) } R_f = \mathbb{R} - \{3\}$$

$$\text{ب) } R_f = \mathbb{R} - \{2\}$$