



۱۹، ۵ آفین

پرنیان دهانی

$$x \pm \sqrt{x-\varepsilon} \quad (x-\varepsilon) \pm \sqrt{x-\varepsilon} + \varepsilon = (\sqrt{x-\varepsilon} \pm \sqrt{\varepsilon})^2 \quad -1$$

$$f(x) = \sqrt{(\sqrt{x-\varepsilon} + \sqrt{\varepsilon})^2} = \sqrt{x-\varepsilon} + \sqrt{\varepsilon}$$

$$g(x) = \sqrt{x-\varepsilon} - \sqrt{\varepsilon}$$

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

$$a = 0 \quad b = \sqrt{\varepsilon} \quad c = -\varepsilon$$

$$\frac{a+b}{c} = -\frac{1}{\sqrt{\varepsilon}} \quad \text{پ}$$

-2

$$D_{\frac{g}{f}} = D_g \cap D_f$$

$$D_g = \{0, 1, 2, 3\}$$

$$x^2 - 4x + 3 = 0$$

$$(x-1)(x-3) = 0 \rightarrow x = 1, 3$$

$$x+3=0 \rightarrow x = -3$$

$$g(0) = \varepsilon, f(0) = \frac{0+2}{3} = \frac{2}{3} \rightarrow \frac{g}{f} = \frac{\varepsilon}{\frac{2}{3}} = \frac{3\varepsilon}{2}$$

$$D_{\frac{g}{f}} = \{0, 2\}$$

$$g(2) = 1, f(2) = \frac{2+2}{\varepsilon-1+3} = \frac{\varepsilon}{-1} = -\varepsilon$$

$$\frac{g}{f}(2) = -\frac{1}{\varepsilon}$$

$$\frac{g}{f} = \left\{ (0, \frac{3\varepsilon}{2}), (2, -\frac{1}{\varepsilon}) \right\} \quad \text{پ}$$

-3

$$a) \quad 2x = 1 \rightarrow x = \frac{1}{2} \rightarrow y = 2$$

$$2x = 3 \rightarrow x = \frac{3}{2} \rightarrow y = -1$$

$$2x = 4 \rightarrow x = 2 \rightarrow y = 2$$

$$2x = -1 \rightarrow x = -\frac{1}{2} \rightarrow y = 4$$

$$f(2x) = \left\{ \left(\frac{1}{2}, 2\right), \left(\frac{3}{2}, -1\right), \left(2, 2\right), \left(-\frac{1}{2}, 4\right) \right\}$$

$$b) \quad x^2 = 1 \rightarrow x = \pm 1 \rightarrow y = 2 \quad x^2 = 4 \rightarrow x = \pm 2 \rightarrow y = 2$$

$$x^2 = 9 \rightarrow x = \pm 3 \rightarrow y = -1 \quad x^2 = 1 \rightarrow x = \pm 1 \rightarrow y = 2 \quad f(2x) = \left\{ (1, 2), (-1, 2), (\sqrt{3}, -1), (-\sqrt{3}, -1), (2, 2), (-2, 2) \right\}$$

$$x = -2 \rightarrow f(x)^2 + 1 = 19$$

$$x = -1 \rightarrow f(x)^2 + 1 = 1$$

(8)

$$x = 1 \rightarrow f(-1)^2 + 1 = 3$$

$$fg^{f(x)+1} = \{(-2, 19), (1, 3), (2, 9), (-1, 1)\}$$

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$$x = 3 \rightarrow f(2)^2 + 1 = 9$$

$$\frac{f}{g} = 2 \rightarrow \frac{f(1)}{g(1)} = \frac{f(2)}{-1} = -2$$

$\nearrow x=1$

$$\frac{f(-1)}{f} = -1$$

$\nearrow x=3$

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

✓

$$h = f \circ g \quad D_f = \{2, 3, 4, -2\} \quad D_g = \{5, 2, -5, -1, 3\}$$

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$$D_h = D_f \cap D_g = \{2, 3, -2\}$$

$$f(x) + g(x) = f(1) + 3 = 5$$

$$f(2) + g(3) = 2 + 3 = 5$$

$$f(-2) + g(-5) = f(-2) + 4 = 4$$

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

✓

$$3x \geq 0 \rightarrow x \geq 0$$

$$3x \geq x^2$$

-6

$$x^2 - 3x \leq 0 \rightarrow 0 \leq x \leq 3$$

$$D_f = [0, 3] - \{2\} = [0, 2) \cup (2, 3]$$

$$[x] + [-x] = \begin{cases} 0 & x \in \mathbb{Z} \\ -1 & x \notin \mathbb{Z} \end{cases}$$

$$g(x) + 1 = 0 + 1 = 1 \neq 0 \rightarrow 2$$

$$g(x) + 1 = -1 + 1 = 0 \quad (\text{ن})$$

$$D = D_f \cap \mathbb{Z} = \{0, 1, 3\}$$

✓

$$\omega x - x^2 \geq 0 \rightarrow x(\omega - x) \geq 0 \rightarrow D_f = [0, \omega] \quad , \quad D_g = \{1, r, \varepsilon, \omega\}$$

-4

$$D_h = D_f \cap D_g$$

$$h(x) \rightarrow f(1) = \sqrt{\omega - 1} - \varepsilon = -r \rightarrow h(1) = -\frac{r}{\omega}$$

$$f(r) = \sqrt{\omega(r) - r^2} - \varepsilon = \sqrt{r - \varepsilon} \rightarrow h = \frac{\sqrt{r - \varepsilon}}{r}$$

$$f(\varepsilon) = \sqrt{\omega(\varepsilon) - \varepsilon^2} - \varepsilon = \sqrt{\varepsilon - \varepsilon} = -r \rightarrow h = -\frac{1}{r}$$

$$f(\omega) = \sqrt{\omega(\omega) - \omega^2} - \varepsilon = -\varepsilon \rightarrow h = \frac{-\varepsilon}{1} = -\varepsilon$$

1, \omega

$$h = \left\{ \left(1, -\frac{r}{\omega}\right), \left(r, \frac{\sqrt{r - \varepsilon}}{r}\right), \left(\varepsilon, -\frac{1}{r}\right) \right\}$$

$$\sqrt{\frac{1 - \varepsilon - \varepsilon}{r}} = \frac{\sqrt{r}}{r}$$

$$D_f \rightarrow \omega - x^2 - \varepsilon \geq 0 \rightarrow x^2 - \omega x + \varepsilon \leq 0 \rightarrow 1 \leq x \leq \omega$$

$$D_f \cap D_g = \{1, r, \varepsilon\}$$

$$\frac{f}{g} = h = \left\{ \left(1, 0\right), \left(r, \frac{\sqrt{r}}{r}\right), \left(\varepsilon, -\frac{1}{r}\right) \right\}$$

-v

$$\text{a)} (x^3 - 3x^2 + 3x - 1) \rightarrow f = (x-1)^3 + 1 \rightarrow (x-1)^3 = y - 1 \rightarrow (x-1) = \sqrt[3]{y-1} \rightarrow u = 1 + \sqrt[3]{y-1}$$

$$\text{b)} y(x^3 - 3x^2 + 3x - 1) \rightarrow yx^3 - 3yx^2 + 3yx - 1 = 0 \quad \Delta = (-3y)^2 - 4(y)(-1) = 9y^2 + 4y \geq 0$$

$R_f = \mathbb{R}$

$$y^2 + y \geq 0 \rightarrow y(y+1) \geq 0 \rightarrow y \leq -1 \vee y \geq 0$$

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

-1

$$x^2 - 2x + 1 = 0 \quad x_0 = \frac{-b}{2a} = \frac{-(-2)}{2} = 1$$

$$y_{\min} = (r)^2 - \varepsilon(r) + 1 = 4 \quad R_f = [4, +\infty)$$

$$-x^2 + 4x + 7 \quad x_0 = \frac{-b}{2a} = \frac{-4}{-2} = 2$$

$$y_{\max} = -(r^2 + 4(r) + 7) + 9 = -9 + 16 + 7 = 14 \quad R_f = (-\infty, 14]$$

$$u|_{x=0} = 0 \rightarrow R_f = [0, +\infty)$$

$$\frac{E}{r} = 2 \quad y_{min} = 1 - r = -1$$

$$4x - x^2 \rightarrow u(r) = \frac{4}{r(-1)} = 2 \rightarrow u(r) = (r)^2 + 4(r) = 4$$

$$0 \leq \sqrt{u(x)} \leq \sqrt{4} \rightarrow 0 \leq y \leq 2$$

$$R_f = [0, 2]$$

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$$\text{الف) } \frac{1}{x} = \frac{1}{x} = R_f = R$$

$$\text{ب) } R_f = R$$

$$\text{ج) } \sqrt{x} = [0, +\infty)$$

$$\text{د) } (R)^2 = [0, +\infty)$$

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$$\text{الف) } \frac{a}{c} = 3 \rightarrow R_f = R - \{3\}$$

$$\text{ب) } \frac{a}{c} = 2 \rightarrow R_f = R - \{2\}$$