

$$y = \sqrt{x f(x)} \Rightarrow x f(x) \geq 0 \Rightarrow \begin{cases} \text{I} & x=0 \text{ یا } f(x)=0 \\ \text{II} & x > 0, f(x) > 0 \\ \text{III} & x < 0, f(x) < 0 \end{cases} \Rightarrow D_f = [2, \infty) \cup [-5, 0]$$

$$y = \sqrt{\frac{-x}{f(x)}} \Rightarrow \frac{-x}{f(x)} \geq 0, f(x) \neq 0 \Rightarrow D_f = (-2, 0) \cup (0, 2) = (-2, 2) - \{0\}$$

↓
f(x) برای x های 2, 0, -2 معجزه باشد

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مبنای تعریف تابع سوال ۳ عدد صحیح: {-2, -1, 0, 1, 2} می باشد.

$$\text{if } x=2 \Rightarrow f(x) - 2f(x) = 4 - 4 + 4 \Rightarrow -f(x) = 2 \Rightarrow f(x) = -2 \\ \Rightarrow f(x) - 2x(-2) = 4 + 4 + 4 \Rightarrow f(-2) = 12$$

$$\left. \begin{aligned} f(2) &= 2 - \sqrt{2+4} = 2 \\ f(x) &= (x \times 2) + 3 = 7 \\ f(1) &= (2 \times 1) + 3 = 5 \\ f(2) &= 2 - \sqrt{2+4} = 2 \end{aligned} \right\} \Rightarrow 7 + 2 = 9$$

$$f(x-1) = a(x-1)^2 - b(x-1) + 2 = ax^2 + a - 2ax - b + 2 \Rightarrow \\ f(x-1) - f(x) = ax^2 + a - 2ax - b + 2 - ax^2 - bx + 1 = -2ax - b + a + 3 = 4x + 2 \\ \Rightarrow \begin{cases} -2a = 4 \rightarrow a = -2 \\ a + b = 2 \rightarrow b = 4 \end{cases} \Rightarrow a - b = -2 - 4 = -6$$

$$f(x) = \frac{x^2 + 4x + 4}{x^2 + 4x + 4} = \frac{(x+2)^2 + 1}{(x+2)^2 + 4} = \frac{(\sqrt{4})^2 + 1}{(\sqrt{4})^2 + 4} = \frac{5}{8} = \frac{5}{8}$$

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

$$f(x) = x^2 + 2 \Rightarrow f(-2) = (-2)^2 + 2 = 6$$

$$\text{الف) } D_f = \{0, 1, 2, 4\} \quad \text{I}$$

$$g(x) = \sqrt{4 - x^2} \Rightarrow 4 - x^2 \geq 0 \Rightarrow x^2 \leq 4 \Rightarrow -2 \leq x \leq 2 \Rightarrow D_g = [-2, 2] \quad \text{II}$$

$$\text{I, II} \Rightarrow D_{\frac{f}{g}} = D_f \cap D_g - \{x \mid g(x) = 0\} = \{0, 1, 2\} - \{-2, 2\} = \{0, 1, 2\}$$

$$\Rightarrow \frac{f}{g} = \{(0, \frac{2}{2}), (1, \frac{5}{2}), (2, \frac{8}{2})\}$$

$$\text{ب) } D_{\frac{g}{f}} = D_g \cap D_f - \{x \mid f(x) = 0\} = \{0, 1, 2\} - \{2\} = \{0, 1\}$$

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

$$\text{الف) } 2f(x) = \{(2, 4), (4, 8), (-2, 4), (1, -4)\}$$

$$\text{ب) } f(x) + 1 = \{(2, 5), (4, 9), (-2, 5), (1, -3)\}$$

$$\text{ج) } 3f(x) + 1 = \{(2, 13), (4, 25), (-2, 13), (1, -11)\} \quad f(x) = \{(2, 1), (4, 4), (-2, 4), (1, -1)\}$$

$$\text{الف) } D_{f-g} = D_f \cap D_g = \{2, 4, 1, -2\} \cap \{1, 2, -1, -2, 3\} = \{1, 2, 3\}$$

$$\Rightarrow f-g = \{(1, 4), (2, 3), (3, 2)\}$$

$$\text{ب) } 2f(x) = \{(2, 4), (4, 8), (1, 4), (3, 2), (2, 4)\}$$

$$D_{\frac{2f}{g}} = D_{2f} \cap D_g - \{x \mid g(x) = 0\} = \{1, 2, 3\} - \{1\} = \{2, 3\} \Rightarrow$$

$$\frac{2f}{g} = \{(2, 4), (3, -2)\}$$