

$$y = \sqrt{x f(x)} \xrightarrow{\text{ریشه ها}} \begin{matrix} x \xrightarrow{\text{ریشه ها}} 0 \\ f(x) \xrightarrow{\text{ریشه ها}} \begin{matrix} 5 \\ 2 \\ -5 \end{matrix} \end{matrix} \Rightarrow x f(x) \geq 0 \Rightarrow \frac{-4-5 \pm \sqrt{4+25}}{2} \Rightarrow D_f = [-5, 0] \cup [2, 5]$$

$$y = \sqrt{\frac{-x}{f(x)}} \Rightarrow \frac{-x}{f(x)} \geq 0 \Rightarrow f(x) \neq 0 \Rightarrow \begin{matrix} -x < 0 \\ f(x) \in \{-2, 0, 5\} \end{matrix}$$

$$\Rightarrow \frac{-4-3 \pm \sqrt{4+9}}{2} \Rightarrow D_f = (-3, 0) \cup (0, 2)$$

$D_f = -2, -1, 1 \rightarrow$ عدد صحیح

$$f(x) - 2f(x) = x^2 - 3x + 4 \xrightarrow{x=2} f(2) - 2f(2) = 2^2 - 4 + 4 = 2 \Rightarrow -f(2) = 2 \Rightarrow f(2) = -2$$

$$f(-2) \xrightarrow{x=-2} f(-2) = 2f(2) = (-2)^2 + 4 + 4 \Rightarrow f(-2) - 2f(-2) = 14 \Rightarrow f(-2) = 14$$

$$f(f(5)) + f(f(1)) \xrightarrow{f(5)+f(1)=7} f(7) + f(5) = 7 + 2 = 9$$

$$5 - \sqrt{5+4} = 2 \quad 2(1) + 3 = 5$$

$$5 - 3 = 2$$

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$$x=1 \Rightarrow \frac{f(0)}{x} - f(1) = 1 \Rightarrow f(1) = -9$$

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$$f(1) = a - b + 2 = -9$$

$$a - b = -11$$

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

$$f(\sqrt{3}-2) = \frac{(\sqrt{3}-2+2)^2 + 1}{(\sqrt{3}-2+2)^2 + 4} = \frac{3+1}{3+4} = \frac{4}{7} = \frac{2}{3}$$

$$f(x - \frac{1}{x}) = \frac{x^4 + 1}{x^4} = \frac{x^4}{x^4} + \frac{1}{x^4} = x^0 + \frac{1}{x^4} = (x - \frac{1}{x})^2 + 2$$

$$\xrightarrow{-3 = x - \frac{1}{x}} f(-3) = (-3)^2 + 2 = 9 + 2 = 11$$

$$g(x) = \sqrt{9-x^2} \Rightarrow 9-x^2 \geq 0 \Rightarrow 9 \geq x^2 \Rightarrow 3 \geq |x| \Rightarrow x \in [-3, 3] = D_g$$

$$D_f \cap D_g = \{2, 1, 0\}$$

الف) $\frac{f}{g} = \left\{ \left(2, \frac{2}{\sqrt{5}}\right), \left(1, \frac{1}{\sqrt{2}}\right), \left(0, \frac{3}{2}\right) \right\} \Rightarrow \left\{ (2, 0), (1, -\sqrt{2}), (0, \frac{3}{2}) \right\}$

ب) $\frac{g}{f} = \left\{ \left(2, \frac{\sqrt{5}}{2}\right), \left(1, \frac{\sqrt{2}}{-1}\right), \left(0, \frac{2}{3}\right) \right\} \Rightarrow \left\{ \left(1, \frac{1}{\sqrt{2}}\right), \left(0, \frac{3}{2}\right) \right\}$

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

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

$$\text{ج) } 3f(x)+1 = \{(2, 4), (3, 49), (-5, 13), (1, 13)\}$$

$$\text{د) } f(2x) = \{(1, 1), (\frac{3}{2}, 4), (-\frac{5}{2}, 2), (\frac{1}{2}, -2)\}$$

$$D_f \cap D_g = \{1, 2, 3\}$$

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

$$\text{ب) } \frac{2f}{g} = \{(1, \frac{4}{5}), (2, \frac{4}{1}), (3, \frac{2}{-1})\} \Rightarrow \{(2, 4), (3, -2)\}$$

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