

$$y = \sqrt{x} f(x) \Rightarrow x f(x) \geq 0$$

	-۵	۰	۲	۵
$f(x)$	+	۰	-	+
x	-	-	+	+
	-	+	-	+

$$D_f = [-5, 0] \cup [2, 5]$$

✓

$$y = \sqrt{\frac{-x}{f(x)}} \Rightarrow \frac{-x}{f(x)} \geq 0$$

	-۳	۰	۲	۵
$f(x)$	-	۰	-	۰
$-x$	+	+	-	-
	-	+	+	-

$$f(x) \neq 0$$

$$\Rightarrow D_f = (-3, 0) \cup (0, 2)$$

$$\Rightarrow \text{اعداد مستبعد} = -2 \text{ و } -1$$

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$$f(x) - 2f(2) = x^2 - 2x + 4$$

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

$$\text{if } x=-2 \Rightarrow f(-2) - 2(-4) = 4 + 8 + 4 \Rightarrow f(-2) + 8 = 16 \Rightarrow f(-2) = 8$$

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جواب

$$f(x) = \begin{cases} x - \sqrt{x+4} & x > 3 \\ 2x+3 & x \leq 3 \end{cases} \quad f(f(5)) + f(f(1)) = ?$$

$$\Rightarrow f(5) = 5 - \sqrt{9} = 2 \Rightarrow f(f(5)) = f(2) = 2(2)+3=7$$

$$\Rightarrow f(1) = 2(1)+3=5 \Rightarrow f(f(1)) = f(5) = 2$$

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جواب

$$f(x) = ax^2 - bx + 2 \Rightarrow f(0) = 2$$

$$f(x+1) - f(x) = 4x+2 \xrightarrow{\text{if } x=1} f(2) - f(1) = 4+2=6 \Rightarrow -2 - f(1) = 6 \Rightarrow f(1) = -8$$

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$$f(x) = ax^2 - bx + 2 \Rightarrow f(1) = a - b + 2 \Rightarrow -8 = a - b + 2 \Rightarrow a - b = -10$$

جواب

$$f(x) = x^2 - 3x + 1 \Rightarrow \begin{cases} f(9) = 9 - 9 + 1 = 1 \\ f(1) = 1 - 9 + 1 = -9 \\ f(7) = 7 - 9 + 1 = -1 \end{cases} \Rightarrow \frac{f(f(7)) + f(1)}{f'(7)} = \frac{f(1) + 0}{(-1)^2} = \frac{-9}{1} = -9$$

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$$f(x) = \begin{cases} 3x + 1 & x \geq 2 \\ x^2 & x < 2 \end{cases} \Rightarrow \begin{cases} f(9) = (3 \times 9) + 1 = 28 \\ f(-2) = (-2)^2 = 4 \\ f(7) = (3 \times 7) + 1 = 22 \end{cases}$$

$$\Rightarrow \frac{f(f(7)) - f(f(-2))}{f(7)} = \frac{(3 \times 22) - (3 \times 4)}{22} = \frac{66 - 12}{22} = \frac{54}{22} = \frac{27}{11}$$

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$$f = \{(2, 9), (3, 2), (7, 1), (1, 9)\} \Rightarrow \begin{cases} f(9) = 1 \\ f(f(9)) = f(1) = 9 \\ f(7) = 2 \\ f(f(7)) = f(2) = 9 \end{cases}$$

$$\Rightarrow \frac{f(f(9)) - f(f(7))}{f(1) - 2} = \frac{9 - 9}{9 - 2} = 0$$

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$$f(x) = \frac{x^2 + 4x + 9}{x^2 + 4x + 0} \quad \text{if } x = \sqrt{7} - 2 \Rightarrow \frac{(\sqrt{7} - 2)^2 + 4(\sqrt{7} - 2) + 9}{(\sqrt{7} - 2)^2 + 4(\sqrt{7} - 2) + 0} = \frac{-1 + 9}{-1 + 0} = \frac{8}{-1} = -8$$

$$\Rightarrow f(f(\sqrt{7} - 2)) = f(2) \Rightarrow \text{if } x = 2 \Rightarrow \frac{4 + 8 + 9}{4 + 8 + 0} = \frac{21}{12} = \frac{7}{4}$$

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$$f(x) = x^2 + \frac{1}{x^2} \quad \text{if } x = \sqrt{x} \Rightarrow (\sqrt{x})^2 + \frac{1}{(\sqrt{x})^2} = x + \frac{1}{x}$$

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

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

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