

$x f(x) = 0$

	$-\infty$	0	2	∞
x	-	-	+	+
$f(x)$	+	0	-	+
$y = \sqrt{x f(x)}$	-	+	0	+

$\Rightarrow D_f = [-\infty, 0] \cup [2, \infty]$ ✓

$y = \sqrt{x f(x)}$

(۲)

$\frac{-x}{f(x)} = 0 \Rightarrow x = 0, \infty, 2, -2$

	$-\infty$	0	2	∞
$-x$	+	+	0	-
$f(x)$	-	0	+	-
$y = \sqrt{\frac{-x}{f(x)}}$	-	+	0	+

$\Rightarrow D_f = (-2, 2) - \{0\}$ ✓

(۱, ۵, ۵)

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

$f(x) - 2f(2) = x^2 - 2x + 1^2 \xrightarrow{\text{در } x=2} f(2) - 2f(2) = 2 \Rightarrow -f(2) = 2 \Rightarrow f(2) = -2$ ✓

$\Rightarrow f(x) = x^2 - 2x + 1^2 + (-2x - 2) \Rightarrow f(x) = x^2 - 4x + 1 \Rightarrow f(-2) = 4 + 8 + 1 = 13$

(۱)

$f(-2) = 13$

(۱, ۵, ۵)

$f(x) = a x^2 - b x$

$f(-2) = 1$

$f(f(\infty)) + f(f(1)) = f(2) + f(\infty) = 7 + 2 = 9$ ✓

$f(1) = \infty$

$f(\infty) = \infty - \sqrt{9} = 2$

$f(2) = 7$

(۲)

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

$f(x-1) = a(x-1)^2 - b(x-1) + 2$

$f(x-1) - f(x) = -2ax + a + b$

$-2ax + a + b = 2x + 7 \Rightarrow -2a = 2 \Rightarrow a = -1, a + b = 7 \Rightarrow b = 8$

(۱, ۵, ۵)

$a - b = -1$

$$\left. \begin{aligned} (\sqrt{3}-2)^2 &= 3-4\sqrt{3}+4 \\ 4(\sqrt{3}-2) &= 4\sqrt{3}-8 \end{aligned} \right\} \Rightarrow \frac{x^2+4x+4}{x^2+4x+4} = \frac{3-4\sqrt{3}+4\sqrt{3}-4+4}{4} = \frac{4}{4}$$

$$f(\sqrt{3}-2) = \frac{4}{4} = 1 \quad \checkmark \quad (5)$$

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$$\left(x - \frac{1}{x}\right)^2 = \frac{x^4+1}{x^2} - 2 \Rightarrow \text{if } f\left(x - \frac{1}{x}\right) = \frac{x^4+1}{x^2} \Rightarrow \text{تابع با عدد 2 متجانس و 2، 1 واحد اضافه می کند}$$

$$\Rightarrow f(-3) = (-3)^2 + 2 = 11 \quad \checkmark \quad (5)$$

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$$g(x) = \sqrt{9-x^2} \Rightarrow x^2 \leq 9 \Rightarrow x \leq 3, x \geq -3 \Rightarrow D_g = [-3, 3] \quad \text{مایل به 0}$$

$$f(x) = \{(2, 0), (1, -4), (0, 2), (3, 1)\}$$

$$\frac{f}{g} = \{(2, 0), (1, \frac{2}{\sqrt{5}}), (0, \frac{3}{4})\} \quad \checkmark$$

$$\frac{g}{f} = \{(2, \frac{1}{0}), (1, \frac{\sqrt{5}}{-4}), (0, \frac{2}{2})\} \quad \checkmark$$

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

$$\text{ج) } f(x+1) = \{(2, 2), (3, 8), (-\infty, 3), (1, -4)\}$$

$$\text{ب) } 3f^2(x+1) =$$

$$\{(2, 2), (3, 49), (-\infty, 13), (1, 13)\} \quad \checkmark$$

$$\Rightarrow f(2x) = \{(1, 1), (\frac{3}{2}, 2), (\frac{-\infty}{2}, 2), (\frac{1}{2}, -2)\}$$

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

!!

(1, 4)

$$\text{ب) } \frac{2f}{g} = \{(1, \frac{1}{2}), (2, \frac{1}{2}), (3, -2)\} \quad \checkmark$$

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