

$$x f(x) \geq 0$$

$$x \in [-1, 0] \cup [2, 4]$$

	-1	-1	0	2	4
x	-	-	0	+	+
$f(x)$	+	0	-	-	+
$xf(x)$	-	0	+	-	+

راش

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

$$x = -3, 0, 2$$

$$D = (-3, 0) \cup (0, 2)$$

1 و 2 و 3
در صحت

$$\frac{-x}{f(x)} \geq 0$$

$$f(x) \neq 0$$

	-3	0	2
$-x$	+	+	-
$f(x)$	-	+	-
$\frac{-x}{f(x)}$	-	+	-

2

$$f(x) - 2f(2) = x^2 - 3x + 4$$

$$f(x) - 2f(2) = 4 - 6 + 4 = 2 \Rightarrow -f(2) = 2 \Rightarrow f(2) = -2$$

$$f(-2) - 2f(2) = f(-2) - (-4) = f(-2) + 4 = 4 + 6 + 4 = 14 \Rightarrow f(-2) = 10$$

3

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

$$f(f(0)) + f(f(1)) \rightarrow f(2) + f(0) = 7 + 2 = 9$$

$$x - \sqrt{x+4} = 2$$

$$2x + 3 = 2$$

$$2x + 3 = 7$$

$$x - \sqrt{x+4} = 2$$

4

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

$$f(x-1) - f(x) = 4x + 2$$

$$a - b = ?$$

$$-2ax + (a + b) = 4x + 2$$

$$a = -2$$

$$a + b = 2 \rightarrow -2 + b = 2 \rightarrow b = 4$$

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

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

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

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

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

$$a - b = -2 - 4 = -6$$

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$f(x) = \frac{x^2 + 4x + 4}{x^2 + 4x + 4} \rightarrow \frac{(\sqrt{x-2})^2 + 4(\sqrt{x-2}) + 4}{(\sqrt{x-2})^2 + 4(\sqrt{x-2}) + 4} =$ $f(\sqrt{x-2}) = ?$ $\frac{2 - 4\sqrt{x-2} + 4 + 4\sqrt{x-2} - 8 + 4}{2 - 4\sqrt{x-2} + 4 + 4\sqrt{x-2} - 8 + 4} = \frac{2 + 4 - 8 + 4}{2 + 4 - 8 + 4} = \frac{2}{2} = \boxed{\frac{1}{2}}$	6
$f(x - \frac{1}{x}) = \frac{x^4 + 1}{x^2}$ $f(-3) = ?$ $\frac{x^4 + 1}{x^2} = x^2 + \frac{1}{x^2} \rightarrow x^2 - 1 = \dots$ $(x - \frac{1}{x})^2 = x^2 + \frac{1}{x^2} + 2$ $f(-3) = (-3)^2 + 2 = \textcircled{11}$	7
$g(x) = \sqrt{9 - x^2}$ $9 - x^2 \geq 0$ $9 \geq x^2$ $-3 \leq x \leq 3$ $\downarrow$ $D_g = [-3, 3]$ $\frac{f}{g} = D_f \cap D_g - \{x \mid f(x) = 0\}$ $= \{0, 1, 2\} - \{2\} = \{0, 1\}$ $\frac{g}{f} = D_f \cap D_g - \{x \mid f(x) = 0\}$ $= \{0, 1, 2\} - \{\pm 2\} = \{0, 1, 2\}$	8
$2f(x) = \{(2, 2), (3, 4), (-4, 4), (1, -4)\}$ $f(x) + 1 = \{(2, 3), (3, 5), (-4, 5), (1, -1)\}$ $3f^2(x) + 1 = \{(2, 5), (3, 17), (-4, 17), (1, 13)\}$ $f(2x) = \{(1, 1), (\frac{3}{2}, 4), (-\frac{3}{2}, 4), (\frac{1}{2}, -4)\}$	9
$f - g = \{(1, 3), (2, 2), (3, 2)\}$ $\frac{2f}{g} = \{(\frac{1}{2}, \frac{2}{1}), (2, 2), (3, -2)\}$ $\frac{2f}{g} = \{(2, 2), (3, -2)\}$	10