

$$x f(x) \geq 0 \quad \begin{cases} x \text{ متی} - f(x) \text{ متی} - & -5 \leq x \leq 0 \\ x \text{ متی} - f(x) \text{ متی} & 4 \leq x \leq 5 \end{cases} \Rightarrow D_f = [-5, 0] \cup [4, 5]$$

✓

$$\frac{-x}{f(x)} \geq 0 \quad \frac{x}{f(x)} \leq 0 \quad \begin{cases} x \text{ متی}, f(x) \text{ متی} - & 0 \leq x \leq 4 \\ x \text{ متی}, f(x) \text{ متی} & -4 \leq x \leq 0 \end{cases} \Rightarrow 0, 4, -1, -2, -3$$

حالت اول: $f(x) < 0, x > 0$
 حالت دوم: $f(x) > 0, x < 0$

۱، ۷۵

۴ + ۳ = ۷
 ۵ + ۲ = ۷
 ۶ + ۱ = ۷

$$f(x) - 2f(x) = x^2 - 4x + 4 \quad f(-2) = ?$$

$$\Rightarrow f(x) - 2f(x) = 2 \quad f(x) = -2$$

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

$$f(-x) = (-x)^2 - 4(-x) = 1 \quad \boxed{f(-2) = 1}$$

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

$$f(f(5)) = f(f(1)) = 9$$

$$f(5) = 5 - \sqrt{9} = 2 \quad f(4) = 18$$

$$f(f(1)) = f(1) = 6 \quad f(5) = 2$$

$$f(x-1) - f(x) = 4x+2 \Rightarrow f(x-1) = a(x-1)^2 - b(x-1)+2 = a(x^2-2x+1) - bx + b+2$$

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

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

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

$$-2a = 4 \quad a = -2$$

$$-2 + b = 2 \quad b = 4$$

$$a \cdot b = -2 \cdot 4 = -8$$

✓

$$f(n) = n^2 - 2n + 1$$

$$\frac{f(x) - f(-x)}{f'(x)} = \frac{V}{1} = V$$

$$f'(x) = 2(x - 1) = 2$$

$$f(-1) = 1 - 2 + 1 = 0$$

$$f^2(x) = (-1)^2 = 1$$

(P) ✓

6

$$\frac{f(x) - f(-x)}{f'(x)} =$$

(P) ✓

$$f(n) = \begin{cases} n+1 & n \geq 2 \\ n^2 & n < 2 \end{cases}$$

$$f(2) = 2(1) = 2$$

$$f(-2) = 2(-2)^2 = 8$$

$$f'(x) = 2(x-1) = 2$$

$$\frac{2 \cdot 8 - 2}{2} = \frac{14}{2} = 7$$

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

$$\frac{f(f(x)) - f(f(-x))}{f'(x) - 2} = \frac{0}{2} = 0$$

(P) ✓

8

$$f(n) = \frac{(n+2)^2 - 2}{n^2 + 2n + 9}$$

$$f(f(\sqrt{2}-1)) = ?$$

(P) ✓

$$n = \sqrt{2} - 1 \quad n+2 = \sqrt{2} \rightarrow (n+2)^2 - 2 \rightarrow (\sqrt{2})^2 - 2 = -1 \rightarrow -1 + 9 = 8$$

$$n^2 + 2n + 9 \rightarrow (\sqrt{2} - 1)^2 + 2(\sqrt{2} - 1) + 9 = 2 - 2\sqrt{2} + 1 + 2\sqrt{2} - 2 + 9 = 8$$

$$f(2) = \frac{8 + 1 + 9}{8 + 1 + 9} = \frac{18}{18} = 1$$

$$\frac{1}{8} = 2$$

9

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

$$(f(\sqrt{n}))^2 - f(n) =$$

(P) ✓

$$f(\sqrt{n}) = n + \frac{1}{n}$$

$$(f(\sqrt{n}))^2 - f(n) = \left(n + \frac{1}{n}\right)^2 - n^2 - \frac{1}{n^2} = \frac{1}{n^2} = 2$$

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$$(f(\sqrt{n}))^2 = \left(n + \frac{1}{n}\right)^2 = n^2 + 2 + \frac{1}{n^2}$$