

(1) $\sqrt{x f(x)} \Rightarrow \begin{matrix} -4 & -5 & 0 & 2 & 5 \\ - & + & - & + & - \end{matrix}$ $D_f = [-5, 1] \cup [2, 5]$ 19, 15
 $D_g = [-5, 0] \cup [2, 5]$ 1, 5

(2) $\sqrt{-x} \Rightarrow \begin{matrix} -3 & 0 & 2 & 5 \\ - & + & - & + \end{matrix}$ $D_f = (-3, 2) - \{0\} \rightarrow -2, -1, 1$ 3 و صحیح
(2) ✓

(3) $f(+2) = f(+2) - 2f(2) = (+2)^2 - 2(+2) + 2 = 4 - 4 + 2 = 2$ (2) ✓
 $f(-2) \Rightarrow f(-2) - 2f(2) = (-2)^2 - 2(-2) + 2 = 4 + 4 + 2 = 10 \rightarrow f(-2) = 10 + \frac{2f(2)}{2 \times 2} \rightarrow f(-2) = 10$

(4) $f(5) \Rightarrow 5 > 3 \rightarrow 5 - \sqrt{5+2} = 5 - 3 = 2 \rightarrow f(f(5)) = 7$ (2) ✓
 $f(2) \Rightarrow 2 < 3 \rightarrow 2 \times 2 + 3 = 7$
 $f(1) \Rightarrow 1 < 3 \rightarrow 2 \times 1 + 3 = 5 \rightarrow f(5) = 2 \rightarrow f(f(1)) = 2$ 7 + 2 = 9

$a(x-1)^2 - b(x-1) + 2 - ax^2 + bx - 2 = 4x + 2$
 $ax^2 + a - 2ax - bx + b + 2 - ax^2 + bx - 2 = 4x + 2$
 $a + b - 2ax = 4x + 2 \rightarrow a + b = 2 \quad 4x = -2ax$
 $-3 + b = 2 \quad 4 = -2a$
 $b = 5 \quad a = -2$ (2) ✓ a - b = -3 - 5 = -8

$f(3) = 3^2 - 3 \times 3 + 1 = 1$
 $f(-1) = (-1)^2 - 3 \times (-1) + 1 = 5$
 $f(2) = 2^2 - 3 \times 2 + 1 = -1$ (2) ✓ (4)

$f(4) = 3 \times 4 + 1 = 13$
 $f(-2) = (-2)^2 = 4$
 $f(2) = 3 \times 2 + 1 = 7$ (2) ✓ (5)

$f(4) = 1 \rightarrow f(1) = 4$
 $f(3) = 2 \rightarrow f(2) = 4$
 $f(1) = 4$ (2) ✓ (6)

$$f(\sqrt{x}-2) = \frac{(\sqrt{x}-2)^2 + 4(\sqrt{x}-2) + 9}{(\sqrt{x}-2)^2 + 4(\sqrt{x}-2) + 5} = \frac{x+4-4\sqrt{x}+4\sqrt{x}-1+9}{x+4-4\sqrt{x}+4\sqrt{x}-1+5} = \frac{12}{8} = \frac{3}{2} \quad (9)$$

$$f(x) = \frac{x^2 + 4x + 9}{x^2 + 4x + 5} = \frac{21}{14}$$

Ⓟ ✓

$$f(\sqrt{x}) = (\sqrt{x})^2 + \frac{1}{(\sqrt{x})^2} = x + \frac{1}{x} \rightarrow \left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2 \quad (10)$$

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

Ⓟ ✓