

$$\sqrt{x f(x)} > 0 \quad \begin{array}{c} -5 \quad 0 \quad 2 \\ - \quad + \quad - \quad + \end{array} \quad D_f = [-5, 2] \cup [2, +\infty) \quad (1)$$

$$\sqrt{-x} > 0 \quad \begin{array}{c} -3 \quad 0 \quad 2 \quad 5 \\ - \quad + \quad - \quad - \quad + \end{array} \quad D_f = (-3, 2) - \{0\} \rightarrow -2, -1, 1 \quad \text{۳ عدد صحیح} \quad (2)$$

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

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

$$\left. \begin{array}{l} f(5) \Rightarrow 5 > 3 \rightarrow 5 - \sqrt{5+2} = 5 - 3 = 2 \quad \left. \begin{array}{l} f(f(5)) = 7 \\ f(f(1)) = 2 \end{array} \right\} \begin{array}{l} 7+2=9 \\ 2+2=4 \end{array} \\ f(2) \Rightarrow 2 < 3 \rightarrow 2 \times 2 + 3 = 7 \\ f(1) \Rightarrow 1 < 3 \rightarrow 2 \times 1 + 3 = 5 \rightarrow f(5) = 2 \end{array} \right\} \quad (3)$$

$$\left. \begin{array}{l} ax^2 + 1 + 2x \\ a(x-1)^2 - b(x-1) + 2 - ax^2 + bx - 2 = 4x + 2 \\ ax^2 + a - 2ax - bx + b + 2 - ax^2 + bx - 2 = 4x + 2 \\ a + b - 2ax = 4x + 2 \rightarrow a + b = 2 \quad 4x = -2ax \\ -3 + b = 2 \quad 4 = -2a \\ b = 5 \quad a = -2 \end{array} \right\} \quad a - b = -2 - 5 = -7 \quad (4)$$

$$\left. \begin{array}{l} f(3) = 3^2 - 3 \times 3 + 1 = 1 \\ f(-1) = (-1)^2 - 3 \times (-1) + 1 = 5 \\ f(2) = 2^2 - 3 \times 2 + 1 = -1 \end{array} \right\} \quad \frac{2 \times 1 + 5}{(-1)^2} = \frac{7}{1} = 7 \quad (5)$$

$$\left. \begin{array}{l} f(4) = 3 \times 4 + 1 = 13 \\ f(-2) = (-2)^2 = 4 \\ f(2) = 3 \times 2 + 1 = 7 \end{array} \right\} \quad \frac{3 \times 13 - 2 \times 4}{7} = \frac{39 - 8}{7} = \frac{31}{7} \quad (6)$$

$$\left. \begin{array}{l} f(4) = 1 \rightarrow f(1) = 4 \\ f(3) = 2 \rightarrow f(2) = 9 \\ f(1) = 4 \end{array} \right\} \quad \frac{9 - 4}{4 - 2} = 0 \quad (7)$$

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

$$f(2) = \frac{2^2 + 4 \times 2 + 9}{2^2 + 4 \times 2 + 5} = \frac{21}{17}$$

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

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