

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



$$\mathbb{R} - [0, 1] \cup [1, +\infty)$$

$$f(x) = \frac{\frac{1}{x+1} - \frac{2}{x}}{\frac{3}{x-1} + \frac{1}{x+2}}$$

$$D_f = \mathbb{R} - \{1, 0, -1, -2, -\frac{1}{2}\}$$

$$\frac{3}{x-1} + \frac{1}{x+2} \neq 0 \Rightarrow x \neq -\frac{1}{2}$$

$$f(x) = \sqrt{\left(\left(\frac{1}{x}\right)^x - 9\right) \left(32 - x^x\right)}$$

$$\left(\frac{1}{x}\right)^x - 9 = 0 \Rightarrow x = -2$$

$$32 - x^x = 0 \Rightarrow x = 2, 0$$

$$D_f = \mathbb{R} - (-2, 2, 0)$$

$$\sqrt{x-1} + \sqrt{4-x} = 3$$

همواره مثبت

$$\sqrt{x-1} \leq 3 \Rightarrow 1 < x < 17$$

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

همواره مثبت

$$\left. \begin{array}{l} x^2 - 1 \geq 0 \Rightarrow x < -1 \text{ یا } x > 1 \\ x^2 - x - 2 > 0 \Rightarrow (x+1)(x-2) > 0 \Rightarrow x < -1 \text{ یا } x > 2 \end{array} \right\} \Rightarrow -1 < x < 2$$

$$-(x+2)(x-b) = 2b + (b-2)x - x^2 = 3 + ax - x^2 \Rightarrow b = 1, 5$$

$$a = -0, 5$$

$$a + b = 1$$

$$f(x) = \begin{cases} x-2, & x \geq 1 \\ 2x+3, & x < 1 \end{cases}$$

$$f(x) - x \geq 0 \Rightarrow \begin{cases} x-2-x \geq 0 & x \geq 1 \\ 2x+3-x \geq 0 & x < 1 \end{cases} \Rightarrow x \geq -3$$

$$f(x) = \begin{cases} (a+1)(x+1), & x > 1 \\ 3a+2x, & x \leq 1 \end{cases} \quad \begin{matrix} 2f(0) = f(-1) + a \\ a = ? \end{matrix}$$

$$2f(1+1) = 3a - 1 + a \Rightarrow 4a = -1 \quad a = -\frac{1}{4}$$

$$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + 2$$

$$f(\sqrt{x}-\sqrt{y}) + f(\sqrt{x}+\sqrt{y}) = \left(\sqrt{\sqrt{x}-\sqrt{y}} + \frac{1}{\sqrt{\sqrt{x}-\sqrt{y}}} + \sqrt{\sqrt{x}+\sqrt{y}} + \frac{1}{\sqrt{\sqrt{x}+\sqrt{y}}} + 2 \right) \times \underbrace{\sqrt{\sqrt{x}-\sqrt{y}} \sqrt{\sqrt{x}+\sqrt{y}}}_{=1} =$$

$$\sqrt{\sqrt{x}-\sqrt{y}} + \sqrt{\sqrt{x}+\sqrt{y}} + \sqrt{\sqrt{x}+\sqrt{y}} + \sqrt{\sqrt{x}-\sqrt{y}} + 2 = \frac{\sqrt{1+2\sqrt{xy}}}{(\sqrt{x}+\sqrt{y})^{\frac{1}{2}}} + \frac{\sqrt{1-2\sqrt{xy}}}{(\sqrt{x}-\sqrt{y})^{\frac{1}{2}}} + 2 = 2\sqrt{4x}$$

$$\left. \begin{aligned} 2 \times 2 f(x) - 2 f(-x) &= 4x^2 - 4x \\ 2 \times 2 f(-x) - 2 f(x) &= 4x^2 + 4x \end{aligned} \right\} \Rightarrow \begin{aligned} 0 f(x) &= 4x^2 + 4x \\ f(x) &= x^2 - x \end{aligned}$$

$$x=0 \rightarrow 2f(0) = 3 \times 0 \cdot f(1) = 3m-1$$

$$2f(0) = 3m-1$$

$$x=-1$$

$$+ 2(f(0)) = 14 + 3m + 3m-1$$

$$0m+10 = 4m-1$$

$$m = 8, 0$$

$$f(0) = 4, 20$$

$$f(-1) \rightarrow f(-1) + f(-1) = \frac{3+12+3}{-1}$$

$$2f(-1) = -18$$

$$f(-1) = -9$$