

10,0

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$$\left(\frac{1}{x}\right)^{x-1} > 0 \Rightarrow x^x f_{(x+1)} > 0 \Rightarrow x^x > 0 \Rightarrow D = [0, +\infty)$$

$$\underbrace{\left(\frac{1}{x}\right)^{x-1}}_{\text{مشتق اول}} - 1 = 0 \rightarrow x = 1 \quad D_f = [1, \infty)$$

1,0

$$x + |x+2| > 0$$

$$x + 2 + x > 0 \Rightarrow x > -1$$

$$x - 2 - x > 0 \Rightarrow \text{غیر ممکن}$$

$$\left. \begin{array}{l} x > -1 \\ \text{غیر ممکن} \end{array} \right\} D = [-1, +\infty) \Rightarrow f_{(-2)} \rightarrow x < 1 \Rightarrow D = (-\infty, 1]$$

$$\frac{x-1}{f(x)} > 0 \left\{ \begin{array}{l} \text{مشتق دوم} \rightarrow (2, 3) \\ \text{مشتق اول} \rightarrow (-4, 1) \end{array} \right\} \rightarrow (-4, 1] \cup (2, 3)$$

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

$$a = -1 \quad b = -2$$

$$f\left(\frac{e}{2}\right) = \left(\frac{e}{2}\right)^2 + \frac{e}{2} = \frac{e^2}{4} + \frac{e}{2}$$

$$f(x) - f\left(\frac{e}{2}\right) = x^2 + x - \left(\frac{e^2}{4} + \frac{e}{2}\right) \rightarrow \frac{x^2 + x - \frac{e^2}{4} - \frac{e}{2}}{x^2} \rightarrow \frac{x^2 + x - \frac{e^2}{4} - \frac{e}{2}}{x^2}$$

$$\frac{(x^2 - e)(x^2 + 5x^2 + 16)}{x^2}$$

$$\left. \begin{array}{l} (x^2 + 5x^2 + 16) > 0 \\ \frac{x^2 - e}{x^2} \end{array} \right\} \begin{array}{l} x > 0 \rightarrow x^2 - e > 0 \Rightarrow x > \sqrt{e} \\ x < 0 \rightarrow x^2 - e < 0 \Rightarrow x < -\sqrt{e} \end{array} \quad D = [-\sqrt{e}, 0) \cup [\sqrt{e}, +\infty)$$

$$f(x) : x = 1 \rightarrow f(x) = 2 - 1 = 1$$

$$f_{(1,0)} : x = 2 \rightarrow f_{(0)} = 1 - 1 = 0$$

$$f(x) + f_{(1,0)} = 1 + 0 = 1$$

$$g(\sqrt[3]{x} - 3) = (\sqrt[3]{x} - 3)^2 + 9(\sqrt[3]{x} - 3) + 2\sqrt[3]{x}(\sqrt[3]{x} - 3) \rightarrow 2\sqrt[3]{x} - 11$$

$$(\sqrt[3]{x})^2 - 3(\sqrt[3]{x})^2 + 3(\sqrt[3]{x}) + 9 - 2\sqrt[3]{x} = -20 - 9(\sqrt[3]{x})^2 + 2\sqrt[3]{x}$$

$$(\sqrt[3]{x})^2 - 6\sqrt[3]{x} + 9 \rightarrow 9(\sqrt[3]{x})^2 - 54\sqrt[3]{x} + 11$$

$$g(\sqrt[3]{x} - 3) = -20$$

$$\Rightarrow f(\sqrt[3]{x} + 2) = 10$$

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

$$g(x) = \sqrt{(\sqrt{n-r} - r)^2} = |\sqrt{n-r} - r| \quad x \geq 1 \quad \rightarrow \quad r\sqrt{n-r} = a + b\sqrt{n+c} \quad \checkmark$$

$$r \leq x \leq 1 \quad \rightarrow \quad r \quad a, b\sqrt{n+c},$$

$$\frac{a+b}{c} = -\frac{1}{r}$$

$$\frac{g}{f} \rightarrow \left\{ \left(2, \frac{3}{2} \right), (0, 6) \right\}$$

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① حاصل نوسی

$$\text{الف) } \left\{ \left(\frac{1}{2}, 2 \right), \left(\frac{3}{2}, -1 \right), (2, 2), \left(-\frac{1}{2}, 6 \right) \right\}$$

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$$\text{ب) } \left\{ (1, 2), (\sqrt{3}, -1), (2, 2) \right\}$$

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$$\text{ج.) } \left\{ (-2, 19), (1, 3), (3, 9), (-1, 1) \right\}$$

$$\text{د) } \left\{ (1, 4), (3, -1), \left(-\frac{1}{2}, \frac{1}{2} \right) \right\}$$

$$\text{ب 10) } \begin{cases} x^2 = 1 \rightarrow x = \pm 1 \\ x^2 = 2 \rightarrow x = \pm \sqrt{2} \\ x^2 = 4 \rightarrow x = \pm 2 \\ x^2 = -1 \rightarrow x \end{cases} \rightarrow \left\{ (\pm 1, 2), (\pm \sqrt{2}, -1), (\pm 2, 2) \right\}$$