

1

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

$$y = \sqrt{x^3 f(x+1)} \rightarrow x^3 \underset{\text{ریشه}}{\quad} \Rightarrow 0 = x$$

$$\rightarrow \left(\frac{1}{x}\right)^{x-1} - 1 = 0 \rightarrow \left(\frac{1}{x}\right)^{x-1} = 1 \rightarrow x-1=0 \rightarrow x=1$$

$$D_y = [0, 1]$$

$\circ = 1$

2

$$f(x) = \sqrt{x + |x+2|} \rightarrow f(-x) = \sqrt{-x + |-x+2|}$$

$$x=2$$

$$\begin{array}{c|c} -x-x+2 & -x+x-2 \\ \hline = -2x+2 & = -2 \end{array}$$

$$-2x+2 \geq 0$$

$$-2x \geq -2$$

$$x \leq 1$$

عدد منفی زیر رادیکال تعریف نمی‌شود

زیر رادیکال بزرگتر مساوی صفر / ریشه $x=1$

$$D_f = (-\infty, 1]$$

3

$$f_{\text{form}} = \{-4, 2, 3\}$$

ریشه های آن

$$y = \sqrt{\frac{x-1}{f_{\text{form}}}} \rightarrow x=1$$

$$\begin{array}{c|c} -4 & 1 & 2 & 3 \\ \hline -\frac{1}{4} & + & \frac{1}{2} & -\frac{1}{3} & + & \frac{1}{9} \end{array}$$

$$D_y = [-4, 1] \cup (2, 3)$$

4

$$9x^2 - 7x^2 - 2x - 3 \Rightarrow (9x^2 - 4x^2 + 1)(-x^2 - 4x - 4)$$

$$(3x^2 - 1)^2 - (x^2 + 4x + 4)$$

$$(3x^2 - 1)^2 - (x+2)^2 \neq 0 \rightarrow 3x^2 - 1 = x+2$$

$$3x^2 - x - 3 = 0$$

س: $3x^2 - x - 3 = 3x^2 + ax + b$

$a = -1$ $b = -3$

$$\sqrt{-(a+b)} = ? \rightarrow -(-1-3) \rightarrow 4 \rightarrow \sqrt{4} = 2$$

5

$$f(x) = x^3 + x$$

$$y = \sqrt{f(x) - f\left(\frac{x}{n}\right)}$$

$$y = \sqrt{x^3 + x - \frac{x^3}{n^3} - \frac{x}{n}}$$

$$y = \sqrt{\frac{1}{n^3}(x^3 - x) + \frac{1}{n}(x^3 - x)}$$

$$y = \sqrt{\frac{1}{n^3}(x^3 - x)(n^3 + 19 + 9n^2) + \frac{1}{n}(x^3 - x)}$$

$$D_y = [-2, 0) \cup [2, +\infty)$$

$$\begin{array}{c|c} -2 & 0 & 2 \\ \hline -\frac{1}{4} & + & \frac{1}{4} & - & \frac{1}{4} \end{array}$$

$$f(n^2+n) = 2n^2 - 1 \quad n^2+n=2 \rightarrow n=1 \rightarrow 2-1=1 \rightarrow \underline{f(1)}$$

$$n^2+n=10 \rightarrow n=3 \rightarrow 10-1=9 \rightarrow \underline{f(10)}$$

$$f(1) + f(10) = ? \rightarrow f(1) + f(10) = \boxed{10}$$

$$f(n) = n^2 - 4n^2 + 12n \xrightarrow{+10-10} (n-2)^2 + 10$$

$$g(n) = n^2 + 9n^2 + 12n \xrightarrow{+10-10} (n+3)^2 - 10$$

$$\frac{(\sqrt{10} - 3 + 3)^2 - 10}{(\sqrt{10} + 3 - 3)^2 + 10} = \frac{10 - 10}{10 + 10} = \frac{0}{20} = \boxed{0}$$

$$f(n) = \sqrt{n-5+5\sqrt{n-5}+5} = \sqrt{(\sqrt{n-5}+2)^2} = \sqrt{n-5} + 2$$

$$g(n) = \sqrt{n-5-5\sqrt{n-5}+5} = \sqrt{(\sqrt{n-5}-2)^2} = \sqrt{n-5} - 2$$

$$f(n) + g(n) = a + b\sqrt{n+c} \rightarrow \sqrt{n-5} + 2 + \sqrt{n-5} - 2 = 2\sqrt{n-5}$$

$$\frac{a+b}{c} \Rightarrow \frac{0+2}{-5} = \boxed{-\frac{2}{5}}$$

$$\begin{matrix} a=0 \\ b=2 \\ c=-5 \end{matrix} \quad \text{نسبة}$$

$$n^2-5n+3=0 \rightarrow (n-1)(n-3) \rightarrow n=1, 3 \quad Df = R - \{1, 3\}$$

$$g(n) = \{(3, 2), (1, 0), (0, 5), (1, 1)\}$$

$$\frac{g}{f} \Rightarrow \left\{ \left(2, -\frac{1}{2} \right), \left(0, \frac{4}{3} \right) \right\} \Rightarrow \boxed{\left\{ \left(2, -\frac{1}{2} \right), \left(0, 4 \right) \right\}}$$

$$g(n) = \{(-2, 3), (2, 2), (1, -1), (-1, 0)\} \quad \left\{ \begin{matrix} 2g(n) + 1 = \{(-2, 7), (3, 5), \\ (-1, 1), (1, 3)\} \end{matrix} \right.$$

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

$$f(n) = \left\{ \left(\frac{1}{2}, 2 \right), (2, 2), \left(-\frac{1}{2}, 4 \right), \left(\frac{3}{2}, -1 \right) \right\} \quad \left\{ \begin{matrix} 2f = \{(1, -2), (3, -1)\} \end{matrix} \right.$$

$$f(n^2) = \{(1, 2), (-1, 2), (2, 2), (-2, 2), (\sqrt{3}, 1), (-\sqrt{3}, 1)\}$$