

1

$$f(x) = \left(\frac{1}{2}\right)^{x-2} - 1, \quad y_1 = \sqrt{x^3 \cdot f(x+1)}$$

$$f(x+1) = \left(\frac{1}{2}\right)^{x-1} - 1 \rightarrow y_1 = \sqrt{x^3 \left(\left(\frac{1}{2}\right)^{x-1} - 1\right)}$$

تعیین علامت

-	0	1
-	+	-

$D_{y_1} = [0, 1]$

2

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

$$\begin{cases} 1 \geq x & -2 \geq 2x & -2-x \geq x \\ x \leq 1 & -2x \leq 2 & -x-2 \leq x & -(2-x) \leq -x \end{cases}$$

$D_f = (-\infty, 1]$

3

$$y_1 = \sqrt{\frac{x-1}{f(x)}} \quad \text{تعیین علامت}$$

-4	1	2	3
-	+	-	+

$D_{y_1} = (-4, 1] \cup (2, 3)$

4

$$y_1 = \frac{1}{9x^4 - 7x^2 - 4x - 3}, \quad y_2 = \frac{1}{3x^2 + ax + b}$$

در صورت یکسان بودن ریشه‌ها دامنه‌ها برابر هستند.

$$\sqrt{-(-1) \pm (3)} = 2$$

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

$a = -1, b = -3$

$$3x^2 - x - 3 = 3x^2 + ax + b$$

5

$$f(x) = x^3 + x, \quad y_1 = \sqrt{f(x) \cdot f\left(\frac{4}{x}\right)} \rightarrow f(x) \geq f\left(\frac{4}{x}\right)$$

$$x^3 + x \geq \frac{64}{x^3} + \frac{4}{x} \quad \text{منحصر بر}$$

$$x^6 + x^4 - 64 - 4x^2 \geq 0$$

تعیین علامت

-2	2
+	+

$D_f = (-\infty, -2] \cup [2, +\infty)$

ریشه‌ها عبارتند از: 2, -2

$$f(x^3+x) = 2x^2 - 1$$

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

$$x=2 \rightarrow f(10) = 8 - 1 = 7$$

$$\rightarrow f(2) + f(10) = 1 + 7 = 8$$

$$f(x) = x^3 + 6x(2-x) \quad 2(x) = x^3 + 9x(x+3) + 2\sqrt{7^2} - 2\sqrt{7}$$

$$2(\sqrt{7}-3) = 7 - 2\sqrt{7^2} + 27\sqrt{7} - 27 + (9\sqrt{7} - 27)(\sqrt{7}-3+3) = -20$$

$$f(\sqrt[3]{2}+2) = 2 + 6\sqrt[3]{2^2} + 12\sqrt[3]{2} + 8 + (\sqrt[3]{2}+12)(2\sqrt[3]{2}-2) = 10$$

$$\frac{-20}{10} = -2$$

$$f(x) = \sqrt{x+4\sqrt{x-4}} \quad 2(x) = \sqrt{x-4\sqrt{x-4}}$$

$$(f(x)+2(x))^2 = x+4\sqrt{x-4} + x-4\sqrt{x-4} + 2(\sqrt{x^2-16x+64})$$

$$a+b\sqrt{x+c} = 2\sqrt{x-4} \leftarrow \sqrt{4x-16} \quad f(x)+2(x) \leftarrow 4x-16$$

$$L: a=0, b=2, c=-4 \rightarrow \frac{a+b}{c} = \frac{2}{-4} = -1/2$$

$$f(x) = \frac{x+2}{(x-1)(x-3)} \quad 2(x) = \{(2,1), (1,0), (3,5), (0,4)\}$$

$$\frac{2}{f} = \{(2, \frac{1}{-4}), (0, \frac{4}{\frac{2}{3}}, \frac{12}{2}, 6)\} \rightarrow 3, 1$$

در باب $f(x)$ حضور ندارد

$$f(x) = \{(1,2), (3,-1), (4,2), (-1,6)\} / 2(x) = \{(2,3), (1,-1), (3,2), (-1,6)\}$$

$$f(2x) = \{(0/5, 2), (1/5, -1), (2, 2), (0/5, 6)\}$$

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

$$2x^2(x)+1 = \{(-2, 19), (1, 3), (3, 9), (-1, 1)\}$$

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