



$$xf(x) > 0$$

$$x = -1, 2, 4 \leftarrow f \text{ ریشه‌ها}$$

$$f(x) < 0, x < 0 \leftarrow [-1, 0]$$

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$$D_f = [-1, 0] \cup [2, 4]$$

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$$\frac{-x}{f(x)} > 0$$

$$f(x) \neq 0$$

۲ ✓

$$f(x) > 0 \leftarrow (-3, 0) \text{ بازه}$$

$$f(x) < 0 \leftarrow (0, 2) \text{ بازه}$$

$$D_f = (-3, 0) \cup (0, 2) \rightarrow \text{اعداد صحیح} = -2, -1, 1$$

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$$f(2) - 2f(2) = 4 - 6 + 4 \rightarrow -f(2) = 2 \rightarrow f(2) = -2$$

برای پیدا کردن $f(2)$

۲ ✓

$$x = -2 \rightarrow f(-2) - 2f(-2) = (-2)^2 - 3(-2) + 4 \rightarrow f(-2) + 4 = 4 + 6 + 4 \rightarrow f(-2) + 4 = 14 \rightarrow f(-2) = 10$$

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$$f(0) = 0 - \sqrt{0} = 0 - 0 = 0 \rightarrow f(f(0)) = f(0) = 0(0) + 3 \checkmark$$

$$f(1) = 2(1) + 3 = 5 \rightarrow f(f(1)) = f(5) = 2 \checkmark$$

۲ ✓

$$7 + 2 = 9$$

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$$f(x-1) = a(x-1)^2 - b(x-1) + c = ax^2 - 2ax + a - bx + b + c$$

$$f(x-1) - f(x) = (-2a)x + a + b = 4x + 2 \rightarrow -2a = 4 \rightarrow a = -2$$

$$a + b = 2 \rightarrow -2 + b = 2 \rightarrow b = 4$$

۲ ✓

$$a - b = -2 - 4 = -6$$

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$$\left. \begin{aligned} f(r) &= 9 - 9 + 1 = 1 \\ f(-1) &= 1 + 1 + 1 = 3 \end{aligned} \right\} \text{---} \text{---} = f(1) + 1 = 2 \quad \textcircled{V}$$

$$\left. \begin{aligned} f(r) &= 5 - 4 + 1 = 2 \\ f'(r) &= (-1)^r = 1 \end{aligned} \right\} \text{---} \text{---} = 1 \quad \textcircled{\frac{2}{1} = 2}$$

Ⓟ ✓

$$f(f) = 3(f) + 1 = 13$$

$$f(-r) = (-r)^r = f$$

$$f(r) = 3(r) + 1 = 7$$

$$\frac{f(13) - f(f)}{7} = \frac{31}{7}$$

Ⓟ ✓

$$\left. \begin{aligned} f(f) &= 1 \rightarrow f(f(f)) = f(1) = 4 \\ f(r) &= 2 \rightarrow f(f(r)) = f(r) = 4 \end{aligned} \right\} \text{---} \text{---} = 4 - 4 = 0$$

$$f(1) - r = 4 - 2 = 2$$

$$\frac{0}{2} = 0$$

Ⓟ ✓

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

$$\left. \begin{aligned} x^r + 5x + 1 &= (x+r)^r + 1 \rightarrow (\sqrt{r})^r + 1 = r + 1 = 5 \\ x^r + 5x + 9 &= (x+r)^r + 1 \rightarrow (\sqrt{r})^r + 1 = r + 1 = 5 \end{aligned} \right\} f(\sqrt{r} - r) = \frac{1}{5} = \textcircled{\frac{1}{5}}$$

$$f(r) = \frac{r^r + 5(r) + 9}{r^r + 5(r) + 1} = \frac{5 + 1 + 9}{5 + 1 + 1} = \frac{15}{7}$$

Ⓟ ✓

$$f(\sqrt{x}) = (\sqrt{x})^r + \frac{1}{(\sqrt{x})^r} = x + \frac{1}{x} \rightarrow (f(\sqrt{x}))^r = (x + \frac{1}{x})^r = x^r + r + \frac{1}{x^r}$$

$$f(x) = x^r + \frac{1}{x^r}$$

Ⓟ ✓

$$\left(x^r + r + \frac{1}{x^r} \right) - \left(x^r + \frac{1}{x^r} \right) = r$$