

$D_{f(a)} = [-4, \omega]$ ✓
 $a f(a) \gg 0 \rightarrow a \gg 0$
 $f(x) \gg 0$

$[2, \omega]$
 $x \leq 0$
 $f(x) \leq 0$

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$D_{f(a)} = [0, +\infty) \cap [-4, \omega] = [0, \omega]$

$\sqrt{-a}$
 $f(a)$
 -3

$a_1 = 0$
 $a_2 = 2$
 $a_3 = \omega$
 $a_4 = -3$

$D_f = (-3, 0) \cup (0, 2)$
 $n = -3, -1, 1 \Rightarrow n = 3$

دارای ۳ صغ است

$a = 2 \rightarrow f(2) - 2f(2) = 2 \Rightarrow -f(2) = 2 \Rightarrow f(2) = -2$

$a = -2 \rightarrow f(-2) - 2(-2) = 2 + 4 + 2 = 12$

$f(-2) + 2 = 12 \Rightarrow f(-2) = 10$

$f(\omega) = \omega - \sqrt{a} = 2 \Rightarrow f(f(\omega)) = f(2) = -2$

$f(1) = \omega \rightarrow f(f(1)) = f(\omega) = 2$

$f(f(\omega)) + f(f(1)) = -2 + 2 = 0$

$a(a-1)^2 - b(a-1) - a a^2 + b a - 2 = a(a^2 - 2a + 1) - b(a-1) - a a^2 + b a$
 $= a a^2 - 2a^2 + a - b a + b - a a^2 + b a \Rightarrow -2a^2 + a + b = 4a + 2$

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

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

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

$$f(n) = \frac{n^2 + (n+2) + 1}{n^2 + (n+2) + 1} = \frac{(n+2)^2 + 1}{(n+2)^2 + 1} \Rightarrow n = \sqrt{3} - 2$$

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$$f(\sqrt{3} - 2) = \frac{(\sqrt{3} - 2 + 2)^2 + 1}{(\sqrt{3} - 2 + 2)^2 + 1} = \frac{2}{4} = \frac{1}{2}$$

$$f\left(n - \frac{1}{n}\right) = n^2 + \frac{1}{n^2} \xrightarrow{+2, -2} f\left(n - \frac{1}{n}\right) = n^2 + \frac{1}{n^2} - 2 + 2$$

$$f\left(n - \frac{1}{n}\right) = \left(n - \frac{1}{n}\right)^2 + 2 \Rightarrow n - \frac{1}{n} = -3 \Rightarrow f(-3) = (-3)^2 + 2 = 11$$

$$f(-3) = 9 + 2 = 11$$

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$$D_f = \{2, 1, 0, 1\}, D_g = \{x \mid x \leq 3\} = [-3, 3]$$

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$$D_f \cap D_g = \{0, 1, 2\} \Rightarrow g(0) = \sqrt{9-0} = \sqrt{9} = 3, g(1) = \sqrt{8}$$

$$g(x) = \sqrt{x} \Rightarrow \frac{f}{g} = \left\{ \left(0, \frac{2}{3}\right), (1, -\sqrt{2}), (2, 0) \right\}$$

$$\frac{g}{f} = \left\{ \left(0, \frac{3}{2}\right), \left(1, \frac{2\sqrt{2}}{-2}\right), \left(2, \frac{0}{0}\right) \right\} = \left\{ \left(0, \frac{3}{2}\right), \left(1, -\sqrt{2}\right) \right\}$$

$$f^2(n) = \{(2, 2), (3, 8), (-5, 4), (1, -4)\}$$

(الف)

$$f(n) + 1 = \{(2, 2), (3, 6), (-5, 3), (1, -1)\}$$

(ب)

$$f^2 f(n) + 1 = \{(2, 4), (3, 19), (-5, 13), (1, 13)\}$$

(ج)

$$f(2n) = \left\{ \left(1, 1\right), \left(\frac{4}{2}, 2\right), \left(-\frac{5}{2}, 2\right), \left(\frac{1}{2}, -2\right) \right\}$$

(د)

الف) در این حالت باید درایه های دوم را از هم کم کنیم

$$D_f \cap D_g = \{1, 2, 3\} \Rightarrow f-g = \{(2, 2), (3, 2), (1, 4)\}$$

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$$\frac{f}{g} = \left\{ (2, 4), (3, -2) \right\}$$

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