

$$f(n) = \sqrt{n+4}\sqrt{n-4} = \sqrt{n-4} + 2 \quad g(n) = \sqrt{n-4}\sqrt{n-4} = |\sqrt{n-4} - 2| = \sqrt{n-4} - 2 \quad n \geq 1$$

$$f(n) + g(n) = a + b\sqrt{n+c} = \sqrt{n-4} + 2 + \sqrt{n-4} - 2 = 0 + 2\sqrt{n-4}$$

$$\frac{a+b}{c} = \frac{2}{-4} = -\frac{1}{2}$$

$$\frac{g}{f} = ? \quad g(n) = \{(1,2), (1,0), (3,5), (0,1)\} \quad f(n) = \frac{n+1}{n^2-4n+3}$$

$$\frac{g}{f} = \left\{ \left(1, \frac{1}{-3}\right), \left(1, \frac{0}{-3}\right), \left(3, \frac{5}{-5}\right), \left(0, \frac{1}{3}\right) \right\}$$

$$g(n) = \{(-1,3), (1,-1), (3,2), (1,0)\} \quad f(n) = \{(1,2), (3,-1), (4,2), (1,4)\}$$

$$f(g(n)) = \left\{ \left(\frac{1}{-3}, 2\right), \left(\frac{3}{-5}, -1\right), \left(1, 2\right), \left(-\frac{1}{2}, 4\right) \right\}$$

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

$$2g'(n) + 1 = \{(-1,9), (1,3), (3,9), (-1,1)\}$$

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

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

$$f(n) = \{(1,1), (3,1), (4,9), (-1,0)\} \quad g = \{(0,1), (1,3), (2,1), (-1,2), (3,3)\}$$

$$h = 2f + g = \{(1,5), (3,5), (-1,4)\}$$

$$f(n) = \sqrt{3n-n} \quad g(n) = [n] + [-n]$$

$$[0,3] \quad n-1 \rightarrow n+1 \quad \left(\frac{f}{g+1}\right)n \quad n \in \mathbb{Z}$$

$$1 + [n] + [-n] \quad n \in \mathbb{Z}$$

$$f(n) = \sqrt{-n^2 + 2n - 4}$$

$$g(n) = \{(1, 4), (2, 1), (3, 4), (0, 1)\}$$

$$h(n) = \frac{f(n)}{g(n)} = \left\{ \frac{0}{4}, \frac{(2, \sqrt{2})}{2}, \frac{(3, 0)}{4}, \frac{(0, \sqrt{-4})}{1} \right\}$$

$$= \{(0, 0), (2, \frac{\sqrt{2}}{2}), (3, 0)\}$$

الف) $y = n^3 - 2n^2 + 3n = n^3 - 2n^2 + 3n - 1 + 1 = (n-1)^3 + 1 = y$

ب) $n-1 = \sqrt[3]{y-1} \quad n = \sqrt[3]{y-1} + 1 \quad y \in \mathbb{R}$

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$$y n^2 - 1 = 0 \quad n = \frac{1}{y} \pm \sqrt{\frac{4}{y^2} + 1}$$

چون مقدار الف $y \neq 0$ پس $R = (-\infty, 1] \cup [4, +\infty)$ $y(y+1) \geq 0$

الف) $n^2 - 2n + 1 = y \quad \min(-\frac{b}{2a}, y) = (1, 1) \quad R = [1, +\infty)$

ب) $-n^2 + 4n + 1 = y \quad \frac{-b}{2a} = 2 \quad \max(2, 1) \quad R = (-\infty, 1]$

ج) $\sqrt{n^2 - 2n - 3} = y \quad \min(1, -1) \quad R_{n^2-2n-3} = [-1, +\infty) \quad R_f = [0, +\infty)$

د) $\sqrt{-n^2 + 4n} = y \quad \max(2, 0) \quad R_{-n^2+4n} = (-\infty, 4) \quad R_f = [0, 4]$

الف) $y = n^3 - 2n^2 + 3n + 1$

ب) $y = n^3 - 4n^2 + 3n + 1$

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ج) $y = \sqrt{n^3 - 4n^2 + 2n + 1} \quad R_{\sqrt{\dots}} = [0, +\infty)$

د) $y = (n^3 - 2n^2 + 3n + 1)^2 = R_f = [0, +\infty)$

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$$y = \frac{n+1}{n^2}$$

$$R = \left\{ \frac{1}{c} \right\}$$

$$R = \{3\}$$

$$y = \frac{n+1}{n+1}$$

$$R = \left\{ \frac{1}{c} \right\}$$

$$R = \{1\}$$