

$$f(n) = \sqrt{n+4\sqrt{n-4}} \Rightarrow f(n) = \sqrt{(\sqrt{n-4}+2)^2} = \sqrt{n-4}+2 \quad (1)$$

$$g(n) = \sqrt{n-4\sqrt{n-4}} \rightarrow g(n) = \sqrt{(\sqrt{n-4}-2)^2} = \sqrt{n-4}-2$$

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

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

$$f(n) = \frac{n+2}{n^2-4n+4} \rightarrow f(n) = \left\{ (2, -\frac{1}{2}), (0, \frac{1}{4}) \right\} \quad (2)$$

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

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

$$D_f \cap D_g = \{1, 3, -1\} \quad (3)$$

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

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

$n^2 = -1$ غنی

$$2g^2(n)+1 = \left\{ (-2, 19), (1, 3), (3, 9), (1, 1) \right\} \quad (ج)$$

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

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

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

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

$$D_f \Rightarrow \begin{cases} \sqrt{4n} \geq n \rightarrow 4n - n^2 \geq 0 \rightarrow 0 \leq n \leq 2 \\ n^2 \neq 0 \rightarrow n \neq 0 \end{cases} \Rightarrow D_f = [0,2] - \{0\} \quad (2)$$

$$D_g \rightarrow \begin{aligned} \text{if } n \in \mathbb{Z} &\rightarrow g(n) = 0 \rightarrow g(n) + 1 = 1 \\ \text{if } n \notin \mathbb{Z} &\rightarrow g(n) = -1 \rightarrow g(n) + 1 = 0 \end{aligned} \quad \cup \cup \rightarrow \cup \cap \mathbb{Z}$$

$$\Rightarrow D\left(\frac{f}{g+1}\right) = \{0,1,2\}$$

$$f(n) = \sqrt{4n - n^2 - 4} \rightarrow D_f = 1 \leq n \leq 2 \quad (4)$$

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

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

$$1) y = n^2 - 3n^2 + 3n + 1 - 1 \rightarrow y = (n-1)^2 + 1 \quad (5)$$

$$n = \sqrt{y-1} + 1 \rightarrow R_f = \mathbb{R}$$

$$2) y = \frac{1}{n^2 - 2n} \rightarrow y n^2 - 2n y = 1 \rightarrow y n^2 - 2n y - 1 = 0$$

$$n = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y} \rightarrow y \neq 0, 4y(y+1) \geq 0 \Rightarrow y \in (-\infty, -1] \cup (0, +\infty)$$

الف) $y = x^2 - 4x + 10$ ext $\left| \begin{array}{c} 2 \\ 4 \end{array} \right. \rightarrow R_f = [4, +\infty)$ (1)

ب) $y = -x^2 + 4x + 3$ ext $\left| \begin{array}{c} 3 \\ 12 \end{array} \right. \rightarrow R_f = (-\infty, 12]$

ج) $y = \sqrt{x^2 - 4x - 3}$ ext $\left| \begin{array}{c} 2 \\ -4 \end{array} \right. \rightarrow R_f = \sqrt{[-4, +\infty)} \Rightarrow$
 $R_f = [0, +\infty)$

د) $y = \sqrt{4x - x^2}$ ext $\left| \begin{array}{c} 3 \\ 4 \end{array} \right. \rightarrow R_f = \sqrt{(-\infty, 4]} \Rightarrow$
 $R_f = [0, 2]$

الف) $R_f = \mathbb{R}$ ب) $R_f = \mathbb{R}$ ج) $R_f = [-1, +\infty)$ د) $R_f = [0, +\infty)$ (9)

الف) $\mathbb{R} - \{3\}$ ب) $\mathbb{R} - \{2\}$ (10)