

$$n \geq 1 \rightarrow g(n), f(n) \geq 0 \rightarrow (g(n) + f(n))^2 =$$

$$n - \varepsilon \sqrt{n - \varepsilon} + n + \varepsilon \sqrt{n - \varepsilon} + 2 \sqrt{n^2 - 19(n - \varepsilon)}$$

$$= 2n + 2 \sqrt{n^2 - 19n + 19\varepsilon} \geq 2n + 2(n - 1) = 4n - 2 \quad \text{نیست}$$

$$= \varepsilon(n - \varepsilon) \rightarrow g_n + f(n) = 2\sqrt{n - \varepsilon} \rightarrow \begin{matrix} a = 0 \\ b = 2 \\ c = -\varepsilon \end{matrix} \rightarrow \frac{a+b}{c} = \frac{2}{-\varepsilon} \left[-\frac{1}{\varepsilon} \right]$$

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

$$g(n) = \left\{ \left(2, \frac{1}{-\varepsilon} \right), \left(0, \frac{\varepsilon}{0} \right) \right\} = \left\{ \left(2, -\frac{1}{\varepsilon} \right), \left(0, 0 \right) \right\} \quad \text{نیست}$$

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

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

$$2) 2g(n) + 1 = \left\{ (-2, 19), (1, 0), (2, 9), (-1, 1) \right\}$$

$$1) \frac{2n}{2} = \left\{ \left(1, \frac{\varepsilon}{-1} \right), \left(0, \frac{\varepsilon}{0} \right), \left(0, \frac{\varepsilon}{0} \right) \right\} \rightarrow \left\{ \left(1, -\varepsilon \right), \left(0, -1 \right) \right\} \quad \text{نیست}$$

$$h(n) = 2f(n)g(n) = \left\{ \left(2, 2 \right), \left(2, 8 \right), \left(-2, 4 \right) \right\} \quad \text{نیست}$$

$$g \neq 1 \rightarrow n \in \mathbb{Z} \quad 1) \quad \text{a) } n \neq 5$$

$$\text{b) } cm > 0 \rightarrow n \geq 0$$

$$\text{c) } \sqrt{cm} \geq n \rightarrow cm \geq n^2 = n^2 \cdot cm \cdot \frac{1}{cm} \rightarrow \frac{1}{cm} \geq \frac{n^2}{cm} \rightarrow n \leq c$$

$$R_f = \{0, 1, c\} \quad \text{نیست}$$

$$f(x) = \sqrt{-(n^2 - 8n + 15)} = \sqrt{-(n-1)(n-5)} \rightarrow \frac{-1}{-1+5} \text{ ع$$

$$h(n) = \left\{ \left(1, \frac{0}{4}\right), \left(2, \frac{\sqrt{3}}{4}\right), \left(3, \frac{0}{4}\right) \right\} \left\{ \left(1, 0\right), \left(2, \frac{\sqrt{3}}{4}\right), \left(3, 0\right) \right\} \text{ ع}$$

$$\text{ا) } y = x^2 - 2x^2 + 2m = y = (n-1)^2 + 1 \rightarrow y-1 = (n-1)^2$$

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

$$\rightarrow y = \frac{1}{n^2 - 2n} \rightarrow y(n^2 - 2n) = 1 \rightarrow y(n^2 - 2n - 1) = 1 \rightarrow n = \frac{y \pm \sqrt{4y^2 + 4y}}{2y} = \frac{-1 \pm \sqrt{1+4y}}{2y} \text{ ع}$$

$$\text{ب) } y = x^2 + 4x + 1 \rightarrow \text{ent} \left| \frac{4}{1} = 4 \right| \text{ ع}$$

$$\rightarrow y = 4 - 1 + 1 = 4 \rightarrow \boxed{R_f = [4, +\infty)} \text{ ع}$$

$$\rightarrow y = -x^2 + 4x + 1 \rightarrow \text{ent} \left| \frac{4}{-1} = -4 \right| \text{ ع}$$

$$\rightarrow -4 + 1 + 1 = -2 \rightarrow \boxed{R_f = (-\infty, 2]} \text{ ع}$$

$$\text{ج) } y = \sqrt{n^2 - 4n - 5} \rightarrow \text{ent} \left| \frac{4}{1} = 4 \right| \text{ ع}$$

$$\rightarrow y = 4 - 1 - 5 = -2 \rightarrow \sqrt{-2} \rightarrow \boxed{R_f = [0, +\infty)} \text{ ع}$$

$$\text{د) } y = \sqrt{4n - n^2} \rightarrow \text{ent} \left| \frac{4}{-1} = -4 \right| \text{ ع}$$

$$\rightarrow y = 4 - 4 = 0 \rightarrow \boxed{R_f = \sqrt{[-\infty, 4]} = [0, 2]} \text{ ع}$$

$$\text{هـ) } y = x^2 - 8x^2 + 2m + 1 \rightarrow \boxed{R_f = \mathbb{R}} \text{ ع}$$

$$\text{و) } y = x^2 - 4x^2 + 2m + 2 \rightarrow \boxed{R_f = \mathbb{R}} \text{ ع}$$

$$\text{ز) } y = \sqrt{n^2 - 4n^2 + 8n + 1} \rightarrow R_f = \sqrt{\mathbb{R}} = [0, +\infty) \text{ ع}$$

$$\text{ح) } y = (n^2 - 4n^2 + 2m + 1)^2 \rightarrow R_f = (\mathbb{R})^2 \rightarrow \boxed{R_f = [0, +\infty)} \text{ ع}$$

$$\text{ط) } y = \frac{n+1}{n-2} \rightarrow R_f = \mathbb{R} - \left\{ \frac{2}{1} \right\} \rightarrow \boxed{R_f = \mathbb{R} - \{2\}} \text{ ع}$$

$$\text{ي) } y = \frac{n+1}{n+1} \rightarrow R_f = \mathbb{R} - \left\{ \frac{2}{1} \right\} \rightarrow \boxed{R_f = \mathbb{R} - \{2\}} \text{ ع}$$