

(۱) $f(n) \begin{cases} n-1 & n \geq 0 \\ f_{n+1} & n < 0 \end{cases}$

$y \begin{cases} x \geq 0 \rightarrow \sqrt{x} \geq 0 \\ x < 0 \rightarrow \sqrt{x+1} \geq 0 \rightarrow -\frac{1}{x} \leq n \end{cases} \Rightarrow D = [-\frac{1}{x}, +\infty)$

(۲) $\frac{r(1+n^r + 12n^r + 9n + 1)}{(r+1)^r} = \frac{r(r+1)}{(r+1)^r} \rightarrow \frac{-\frac{1}{r}}{-\frac{1}{r} + 0} \rightarrow D = \mathbb{R} \setminus \{-\frac{1}{r}\}$

(۳) $f(n) \begin{cases} \frac{n^r + rn - n - r}{(n-1)(n+1)}, & n \neq \pm 1 \\ \frac{an+r}{n+b}, & n = \pm 1 \end{cases}$

$x=0 \rightarrow r = 0 + C \rightarrow C = r$

$x=1 \rightarrow \frac{a+r}{1+b} = r \rightarrow a+r = r + rb$
 $x=-1 \rightarrow \frac{r-a}{b-1} = 1 \rightarrow r-a = b-1$
 $f = r + fb \rightarrow b = \frac{1}{r}, a = \frac{a}{r}$

$a+b+C = r + \frac{1}{r} + \frac{a}{r} = a$

(۴) $f(n) = \frac{n+1}{n-1} \rightarrow \frac{n+1}{n-1}$
 $g(n) = \frac{n^r-1}{n^r+an+b} \rightarrow \frac{(n+1)(n-1)}{(n-1)^r}$
 $\left. \begin{matrix} a = -1 \\ b = +1 \\ C = +1 \end{matrix} \right\} a+b+C = 0$

(۵) $(n+1-r)^r (n+1-1) + (1-n-r)^r (1-n-1)$

$(n-r)^r(n) + (-n-r)^r(-n) = n^r + rn - rn^r - n^r - rn - rn^r = -2n^r$

$$(9) \quad f(1-x) = \begin{cases} \sqrt[3]{x} + 1 & x \leq 0 \\ x\sqrt{x} & x > 0 \end{cases} \quad (2)$$

$$\begin{cases} 1-x = 1 \rightarrow x = 0 \\ 1-x = -1 \rightarrow x = 2 \end{cases} \quad \left. \begin{aligned} & f(1) + f(-1) = \sqrt[3]{-1} + 1 + x\sqrt{x} = \boxed{0} \end{aligned} \right\}$$

$$(10) \quad x + \sqrt{x} = 4 \rightarrow x + \sqrt{x} - 4 \rightarrow (\sqrt{x} + 2)(\sqrt{x} - 2) = 0 \rightarrow \sqrt{x} = 2 \rightarrow x = 4 \quad (2)$$

$$f(4) = 4^2 + 12 = 16 + 12 = \boxed{28} \quad (2)$$

$$(11) \quad \begin{cases} f(x-1) = (x-1)^2 + (x-1) \\ f(1-x) = -(x-1)^2 - (x-1) \end{cases} \quad \left. \begin{aligned} & f(x-1) + f(1-x) = \boxed{0} \end{aligned} \right\} \quad (2)$$

$$(12) \quad \begin{cases} f(1) = \sqrt{f+ka} + k+1 \\ g(1) = \sqrt{b-f} + 2k \end{cases} \quad \left. \begin{aligned} & f \cdot g(1) = \sqrt{f+ka} + 2k + 1 - \sqrt{b-f} - 2k \\ & 2k - 2k - 1 = k \rightarrow 2k = -1 \rightarrow k = -\frac{1}{2} \end{aligned} \right\} \quad (2)$$

$$\rightarrow ka < f \rightarrow a < \frac{f}{k} \quad b \geq f \rightarrow ka \leq \frac{b}{k} - k = f - 2 + 1 = \boxed{-1} \quad (2)$$

منفصل $a = \frac{f}{k}$ $b = f$

$$(13) \quad \begin{cases} g = \sqrt{x+1} \rightarrow D = [-1, +\infty) \\ f = \sqrt{x-1} + x \rightarrow D = (-\infty, 1] \end{cases} \quad \left. \begin{aligned} & D = [-1, 1] \rightarrow m = 1 \end{aligned} \right\} \quad (2)$$

$$f - g(1) = \sqrt{1} + 1 - \sqrt{1} = 1 - 1 + 1 = 1 \rightarrow n = \boxed{1} \quad (2)$$

$$m+n = \boxed{1+1=2} \quad (2)$$

۹. اشتراک دامنه f و g فقط $x=1$ است پس:

$$D_f = \left[\frac{r_a}{r}, +\infty \right) \quad D_g = (-\infty, \frac{b}{r}] \xrightarrow{\cap} \{1\}$$

$$\frac{r_a}{r} = \frac{b}{r} = 1 \rightarrow a = \frac{r}{r} \quad b = r$$

$$r f(1) - g(1) = r \rightarrow rK - r - rK = K \rightarrow K = -1$$

$$r a - \frac{b}{r} = K = \textcircled{r}$$