

$$y = \sqrt{f(n) - n + 1} \rightarrow f(n) - n + 1 \geq 0 \rightarrow f(n) = \begin{cases} n-1 & [n] > k \\ n+k & [n] \leq k \end{cases} \rightarrow \begin{cases} n-1 & n \geq a \\ n+k & n < a \end{cases} \quad (2) \textcircled{1}$$

$$f(n) \geq 0 \rightarrow n-1-n+1 \geq 0 \rightarrow n \geq 0 \rightarrow n \geq a \cap n \geq 0 \quad (1)$$

$$\rightarrow n+k-n+1 \geq 0 \rightarrow n+k \geq 0 \rightarrow n \geq -k \rightarrow -\frac{k}{k} \leq n < a \quad (2)$$

$$(1) \cup (2) \rightarrow n \geq a \cup -\frac{k}{k} \leq n < a \rightarrow \boxed{Dy = [-\frac{k}{k}, +\infty)}$$

$$y = \frac{kx^k + kyx^k + 1(n+k)}{(kx^k + k(n+1))^k} \rightarrow \frac{k(1n^k + 1kn^k + 9n+1)}{(k(n+1))^k} = \frac{k(n+1)^k}{(k(n+1))^k} = \frac{k}{k(n+1)} \quad (2) \textcircled{2}$$

$$Dy = k(n+1) \neq 0 \quad k(n+1) \neq -1 \quad n \neq -\frac{1}{k} \quad Dy = 1R - \left[-\frac{1}{k}\right]$$

$$f(n) = \begin{cases} \frac{n^k + kn^k - n - k}{n^k - 1} & n \neq \pm 1 \\ \frac{an+k}{n+b} & n = \pm 1 \end{cases} \quad g(n) = n+c \quad b+c=? \quad (2) \textcircled{3}$$

$$\rightarrow \frac{(n-1)(n^k + kn^k + k)}{(n-1)(n^k - 1)} = \frac{(n+1)(n+k)}{(n+1)(n-1)} = n+k \quad g(n) = f(n)$$

$$\text{if } n=1 \rightarrow \frac{a+k}{1+b} = k \quad 9+k \cdot b = a+k \quad n+k = n+c \rightarrow c=k$$

$$\text{if } n=-1 \rightarrow \frac{-a+k}{-1+b} = 1 \quad -1+b = -a+k \quad \begin{cases} a-kb=k \\ b+a=k \end{cases} \rightarrow kb = -k \rightarrow b = -\frac{k}{k}$$

$$b+c = \frac{1}{k} + k = \frac{1+k^2}{k} = \frac{1}{k} \quad \checkmark$$

$$f(n) = \frac{n+1}{n-c} \quad g(n) = \frac{n^k-1}{n^k+an+b} \quad \frac{n+1}{n-c} = \frac{n^k-1}{n^k+an+b} \rightarrow \frac{n+1}{n-c} = \frac{(n-1)(n+1)}{(n-1)(n+1)} \rightarrow c=1 \quad (2) \textcircled{4}$$

$$\rightarrow n^k+an+b = (n-1)^k = n^k - kn + 1$$

$$c=1 \quad a=-k \quad b=1 \quad a+b+c = 1+1-k = 0 \quad \checkmark$$

$$f(n) = (n-k)^k (n-1) \quad g(n) = f(n+1) + f(1-n) \quad (2) \textcircled{5}$$

$$f(n+1) = (n+1-k)^k (n+1-1) = (n^k + k - kn) n = n^k - kn^k + kn \quad (1)$$

$$f(1-n) = (1-n-k)^k (1-n-1) = (n^k + k + kn) (-n) = -n^k - kn^k - kn \quad (2)$$

$$\xrightarrow{(1)+(2)} g(n) = n^k - kn^k + kn - n^k - kn^k - kn = \boxed{-1n^k} \quad \checkmark$$

$$f(1-2n) = \begin{cases} \sqrt[2]{2n} + k & n \leq 0 \\ k\sqrt{2n} & n > 0 \end{cases} \quad f(1) + f(k) = k+1 = \boxed{0} \quad (2) \textcircled{6}$$

$$f(-1) \Rightarrow 1-2n = -1 \quad -2n = -2 \quad n=1 \quad k\sqrt{1} = k \quad \checkmark$$

$$f(k) \Rightarrow 1-2n = k \quad -2n = k-1 \quad n = -\frac{k-1}{2} \quad \sqrt[2]{-1} + k = 1 \quad \checkmark$$

$$f(n+\sqrt{n}) = n^k + kn \quad f(4) = 141$$

(2) (V)

$$n + \sqrt{n} = 4 \rightarrow \sqrt{n} = 4 - n \xrightarrow{\text{تربيع}} n = 16 + n^2 - 12n \Rightarrow n^2 - 12n + 16 = 0$$

$$(n-4)(n-9) = 0 \quad \text{if } n=4 \rightarrow 4 + \sqrt{4} = 4 \quad \text{if } n=9 \rightarrow 9 + \sqrt{9} \neq 4$$

$$f(4) = 4^k + k \times 4 = 16 + 12 = 28 \quad \text{(النتيجة هي 28 وليس 141)}$$

$$f(n) = n^k + n \quad f(n-1) + f(1-n)$$

(2) (1)

$$f(n-1) = (n-1)^k + n-1 = n^k + kn - kn^k - 1 + n-1 = n^k - kn^k + kn - 1$$

$$f(1-n) = (1-n)^k + 1-n = 1 - n^k - kn + kn^k + 1 - n = -n^k + kn^k - kn + 1$$

$$f(n-1) + f(1-n) = n^k - kn^k + kn - 1 - n^k + kn^k - kn + 1 = 0$$

$$f(n) = \sqrt{ka - kn} + k - 1 \quad g(n) = \sqrt{b - kn} + k$$

(2) (9)

$$f \circ g = \{(1, k)\} \quad ka - \frac{b}{k} - k = ?$$

$$ka - kn > 0 \quad -ka > -kn \quad \frac{ka}{k} < n \quad b - kn > 0 \quad kn \leq b \quad n \leq \frac{b}{k}$$

$$n \leq \frac{b}{k} \quad \frac{b}{k} = 1 \rightarrow b = k \quad = \text{Calc of } f \circ g \text{ is } f \circ g = \{(1, k)\} \text{ if } f \circ g = \{(1, k)\}$$

$$n > \frac{ka}{k} \quad \frac{ka}{k} = 1 \rightarrow a = \frac{k}{k}$$

$$f(1) - g(1) = k - 1 - k = -1$$

$$-k - 1 = k \quad k = -1$$

$$ka - \frac{b}{k} - k = k \times \frac{k}{k} - \frac{k}{k} - (-1) = k - 1 + 1 = k$$

$$f(n) = \sqrt{m-n} + n \quad g(n) = \sqrt{kn+r} \quad D_{f \circ g} = [-1, \infty)$$

(2) (10)

$$f \circ g(r) = 4\sqrt{r} \quad m+n=?$$

$$D_f \cap D_g = [-1, \infty)$$

$$kn+r > 0 \quad kn > -r \quad n > -1 \quad D_g = [-1, \infty)$$

$$m-n > 0 \quad n \leq m \quad m \leq \sqrt{r} \rightarrow D_f = (-\infty, \sqrt{r}]$$

$$f(r) - g(r) = \sqrt{r-k} + r - \sqrt{4+r} = r+n - \sqrt{r} - 4\sqrt{r} \rightarrow n = 1\sqrt{r} - r$$

$$m+n = 1\sqrt{r} - r + r = \boxed{1\sqrt{r}}$$