

$$y = \sqrt{f(u) - u + 1} \quad f(u) = \begin{cases} ru - 1; [u] > r \rightarrow u > \frac{1}{r} \\ ru + r; [u] \leq r \rightarrow u < \frac{1}{r} \end{cases} \quad (1)$$

$$\left. \begin{array}{l} u > \frac{1}{r} \rightarrow ru - 1 - u + 1 > 0 \rightarrow u > \frac{1}{r} \rightarrow \left(\frac{1}{r}, +\infty\right) \\ u < \frac{1}{r} \rightarrow ru + r - u + 1 > 0 \rightarrow ru + r > 0 \rightarrow u > -\frac{r}{r} \rightarrow \left[-\frac{r}{r}, +\infty\right) \end{array} \right\} \xrightarrow{U} D_y = \left[-\frac{r}{r}, +\infty\right)$$

$$y = \frac{ru^r + ru^r + 1(u + r)}{(fu^r + fu + 1)^r} = \frac{r(1u^r + 1u^r + u + 1)}{(fu^r + fu + 1)^r} = \frac{r(ru + 1)^r}{((ru + 1)^r)^r} = \frac{r(ru + 1)^r}{(ru + 1)^{r^2}} = \frac{r}{ru + 1} \quad (2)$$

نوٹ: $fu^r + fu + 1 \neq 0 \quad (ru + 1)^r \neq 0 \Rightarrow u \neq -\frac{1}{r} \quad D_y = \mathbb{R} - \left\{-\frac{1}{r}\right\}$

$$f(u) = \begin{cases} \frac{u^r + ru^r - u - r}{u^r - 1}; u \neq \pm 1 \\ \frac{au + r}{u + b}; u = \pm 1 \end{cases} \quad g(u) = u + C \quad (3)$$

$$\frac{u^r + ru^r - u - r}{u^r - 1} = \frac{(u - 1)(u^r + ru + r)}{(u - 1)(u + 1)} = \frac{(u - 1)(u + r)(u + 1)}{(u - 1)(u + 1)} = u + r$$

$$\Rightarrow u + r = u + C \Rightarrow \boxed{C = r}$$

$$u = 1 \rightarrow r = \frac{a + r}{1 + b} \Rightarrow \begin{cases} r + rb = a + r \end{cases}$$

$$u = -1 \rightarrow 1 = \frac{-a + r}{-1 + b} \Rightarrow \begin{cases} -1 + b = -a + r \\ r + rb = r \Rightarrow \boxed{b = \frac{1}{r}} \end{cases}$$

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

$$f(u) = \frac{u + 1}{u - c} \quad g(u) = \frac{u^r - 1}{u^r + au + b} = \frac{(u - 1)(u + 1)}{(u - c)(u - 1)} \rightarrow (u - 1)^r = u^r - ru + 1 \quad (4)$$

$$D_f = \mathbb{R} - \{c\}$$

$$D_g = \mathbb{R} - \{1, c\} \rightarrow D_f = D_g \Rightarrow \boxed{C = 1}$$

$$a = -r \quad b = 1$$

$$a + b + C = -r + 1 + 1 = \boxed{0}$$

$$f(u) = (u-r)^r (u-1) \quad f(u+1) + f(1-u) = ? \quad (2)$$

$$f(u+1) = \left(\cancel{u-r}^{u-r} + 1\right)^r (u+1-1) = \left(\cancel{u^r - ru^r + ru}^{u^r - ru^r + ru} + 1\right)(u) \quad \left\{ \begin{array}{l} \oplus \\ \ominus \end{array} \right\} \quad \boxed{-\Lambda u^r}$$

$$f(1-u) = \left(\cancel{1-u-r}^{1-u-r} + 1\right)^r (1-u-1) = \left(\cancel{1-u^r - ru^r + ru}^{1-u^r - ru^r + ru} + 1\right)(-u) \quad \left\{ \begin{array}{l} \oplus \\ \ominus \end{array} \right\}$$

$$f(1-ru) = \begin{cases} \sqrt{u} + r & u \leq 0 \\ r\sqrt{u} & u > 0 \end{cases} \quad f(-1) + f(r) = ? \quad (4)$$

$$f + 1 = \boxed{0}$$

$$1-ru = -1 \Rightarrow u = 1 \Rightarrow r\sqrt{1} = r$$

$$1-ru = r \Rightarrow u = -1 \Rightarrow \sqrt{-1} + r = 1$$

$$f(u + \sqrt{u}) = u^r + ru \quad f(4) = ? \quad (5)$$

$$u + \sqrt{u} = 4 \xrightarrow{\sqrt{u}=t} t^2 + t - 4 = 0 \Rightarrow (t+r)(t-r) = 0 \quad \left\{ \begin{array}{l} t = -r \Rightarrow \sqrt{u} = -r \text{ (no)} \\ t = r \Rightarrow \sqrt{u} = r \Rightarrow u = r^2 \end{array} \right.$$

$$f(4) = r^r + r(r) = r^2 + 1r = \boxed{r^2 + 1r}$$

$$f(u) = u^r + u \quad f(u-1) + f(1-u) = ? \quad (1)$$

$$f(u-1) = (u-1)^r + (u-1)$$

$$f(1-u) = (1-u)^r + (1-u) = -(u-1)^r - (u-1) \quad \left\{ \begin{array}{l} \oplus \\ \ominus \end{array} \right\} \quad f(u-1) + f(1-u) = \cancel{(u-1)^r} + \cancel{(u-1)} - \cancel{(u-1)^r} - \cancel{(u-1)} = \boxed{0}$$

$$f(u) = \sqrt{ru - ra} + k - 1 \Rightarrow f(u) = \sqrt{ru - ra} + r + k \quad g(u) = \sqrt{b - ru} + rk \quad (9)$$

$$rf - g = \{(1, k)\} \xrightarrow{g, f} \{1\}$$

$$D_f = ru - ra \geq 0 \Rightarrow u \geq \frac{ra}{r} \quad D_g = b - ru \geq 0 \Rightarrow u \leq \frac{b}{r} \Rightarrow \frac{ra}{r} = \frac{b}{r} = 1 \Rightarrow \frac{b}{a} = \frac{r}{r} = 1 \Rightarrow b = a$$

$$r\sqrt{r - \left(\frac{r}{r}\right)r} + rk - 1 = \sqrt{r - r} - rk = k \Rightarrow rk = -r \Rightarrow k = -1 \quad \frac{ra - \frac{b}{r} - k}{r - r + 1} = \frac{r - \frac{r}{r} - (-1)}{1} = \frac{r - 1 + 1}{1} = \frac{r}{1} = r \quad \boxed{r}$$

$$f(u) = \sqrt{m-u} + n \quad g(u) = \sqrt{ru+r} \quad (6)$$

$$D_{f,g} = [-1, V] \quad f(u) \times g(u) = (\sqrt{m-u} + n)(\sqrt{ru+r})$$

$$u \geq -1 \quad m-u \geq 0 \Rightarrow u \leq m \xrightarrow{D_{f,g} = [-1, V]} \boxed{m = V}$$

$$f(r) - g(r) = 4\sqrt{r} \Rightarrow \sqrt{V-r} + n - \sqrt{4+r} = 4\sqrt{r} \Rightarrow r + n - \sqrt{4+r} = 4\sqrt{r} \Rightarrow n = 4\sqrt{r} - r + \sqrt{4+r}$$

$$m+n = V + 4\sqrt{r} - r = \boxed{4\sqrt{r} + V}$$