

$$y = \sqrt{f(x) - x + 1}$$

$$[x] > c \Rightarrow x > c \Rightarrow x - 1 > c$$

①

$$[x] \leq c \Rightarrow x \leq c \Rightarrow x + 1 \leq c + 1$$

$$y = \sqrt{x - 1 - x + 1} = \sqrt{x} \xrightarrow{x > 0} D_f: (0, +\infty)$$

$$D_f: [-\frac{c}{r} + \infty)$$

$$y = \sqrt{f(x) - x + 1} = \sqrt{x + c} \rightarrow x + c > 0 \rightarrow x > -c \rightarrow x > -\frac{c}{r} \rightarrow D_f: [-\frac{c}{r}, \infty)$$

$$y = \frac{r^2 x^r + r^2 x^r + (x + c)^r}{(r^2 x^r + r^2 x^r + (x + c)^r)^r} = \frac{r^2 (x + 1)^r}{(x + 1)^{2r}} = \frac{r^2}{(x + 1)^r} = \frac{r^2}{x + 1}$$

②

$$\Rightarrow y = \frac{r^2}{x + 1} \Rightarrow x + 1 \neq 0 \rightarrow x \neq -1 \rightarrow x \neq -\frac{1}{r} : D_f = \mathbb{R} - \{-\frac{1}{r}\}$$

$$f(x) = \begin{cases} \frac{x^r + r x^r - x - c}{x^r - 1} & x \neq \pm 1 \\ \frac{a x + c}{x + b} & x = \pm 1 \end{cases}$$

$$g(x) = x + c \xrightarrow{\text{نسبتی صفر}} \frac{0 + r(1) - 0 - c}{0 - 1} = \frac{-c}{-1} = c$$

③

$$g(1) = 1 + c, g(-1) = -1 + c$$

$$r = \frac{a x + c}{x + b} \xrightarrow{x=1} \frac{a + c}{b + 1} = r \Rightarrow a + c = r(b + 1)$$

$$\Rightarrow b + c = r - a$$

$$+1 = \frac{r - a}{b - 1} \Rightarrow b = \frac{1}{r}$$

$$g(x) = f(x) \Rightarrow g(r) = f(r) \Rightarrow g(r) = 0 + c = r \Rightarrow c = r$$

$$f(x) = \frac{x + 1}{x - c} \quad g(x) = \frac{x^r - 1}{x^r + a x + b} \xrightarrow{f(x) = g(x)} \frac{(x - 1)(x + 1)}{x^r + a x + b} = \frac{x + 1}{x - c} = \frac{(x + 1)(x - 1)}{(x - c)(x - 1)}$$

④

$$\Rightarrow (x - c)(x - 1) = x^r - x - c x + c = x^r + x(-1 - c) + c = x^r + a x + b$$

$$\Rightarrow \frac{1}{b} = \frac{1}{c} \quad a = -1 - c \Rightarrow a + b + c = (-1) + (-c) + c + \frac{1}{c} = \frac{1}{c} - 1$$

$$f(x) = (x - r)^r (x - 1) \quad g(x) = f(x + 1) + f(-x + 1) \Rightarrow f(x + 1) = (x + 1 - r)^r (x + 1 - 1)$$

⑤

$$= (x - r)^r (x) = x(x^r - r x^{r-1} + \dots) = x^r - r x^{r-1} + \dots \quad f(-x + 1) = (-x + 1 - r)^r (-x + 1 - 1)$$

$$= (-x - r)^r (-x) = (-x^r - r x^{r-1} - \dots)(-x) = x^r + r x^{r-1} + \dots \Rightarrow f(x + 1) + f(-x + 1) = x^r - r x^{r-1} + \dots + x^r + r x^{r-1} + \dots = 2x^r$$

$$f(x) = \sqrt{x + r} \quad x < 0 \Rightarrow f(-1) + f(1) = -1 = 1 - r \Rightarrow r = 2 \Rightarrow x = 1 \Rightarrow f(-1) = \sqrt{-1 + 2} = 1$$

⑥

$$f(x) = \sqrt{x - 1 - x + 1} = \sqrt{x - 1} \Rightarrow x = -1 \Rightarrow x = -1 \Rightarrow f(x) = \sqrt{-1 - 1 + 1} = 1$$

$$f(x+\sqrt{x}) = x^c + \sqrt{x} \quad f(x) \Rightarrow c = x + \sqrt{x} \Rightarrow x = c \Rightarrow (c)^c + \sqrt{c} = c \quad (5)$$

$$f(x) = x^c + \sqrt{x} \quad f(x-1) + f(1-x) = ? \Rightarrow x-1 = t \Rightarrow 1-x = -t$$

$$\Rightarrow f(x-1) + f(1-x) = f(t) + f(-t) \Rightarrow \begin{cases} f(t) = t^c + \sqrt{t} \\ f(-t) = -t^c - \sqrt{t} \end{cases} \Rightarrow f(t) + f(-t) = t^c + \sqrt{t} - t^c - \sqrt{t} = 0$$

$$\Rightarrow f(x-1) + f(1-x) = 0$$

$$\left. \begin{aligned} f(x) &= \sqrt{cx - ca} + k - 1 \\ g(x) &= \sqrt{bx - cx} + k \end{aligned} \right\} \Rightarrow f-g = \{1, k\} \Rightarrow \begin{cases} D_{f-g} = \{1\} \\ R_{f-g} = \{k\} \end{cases} \quad (9)$$

$$D_{f-g} = \{1\} \Rightarrow \begin{cases} \sqrt{cx - ca} = \sqrt{cx - ca} \Rightarrow cx - ca = 0 \Rightarrow c = ca \Rightarrow a = \frac{c}{c} \\ \sqrt{bx - cx} = \sqrt{bx - cx} \Rightarrow bx - cx = 0 \Rightarrow b = c \end{cases}$$

$$(f-g)(1) = k \Rightarrow (0 + k - 1) - (0 + k) = k \Rightarrow k - k = k \Rightarrow \underline{k = -1}$$

$$\Rightarrow ca - \frac{b}{c} - k = c\left(\frac{c}{c}\right) - \frac{c}{c} - (-1) = c - 1 + 1 = 1 \quad (12)$$

$$\left. \begin{aligned} f(x) &= \sqrt{m-x} + n \Rightarrow D_f = [-\infty, m] \\ g(x) &= \sqrt{cx+c} \Rightarrow \langle cx+c \rangle_{\geq 0} \Rightarrow \langle x \rangle_{\geq -1} \Rightarrow x \geq -1 \end{aligned} \right\} D_{f \times g} = D_f \cap D_g$$

$$\Rightarrow D_g = [-1, +\infty)$$

$$\Rightarrow D_f \cap D_g = [-\infty, m] \cap [-1, +\infty) = [-1, m] = [-1, v] \Rightarrow \underline{m = v}$$

$$(f-g)(x) = f(x) - g(x) \Rightarrow \begin{cases} f(x) = \sqrt{v-x} + n = \sqrt{c} + n = c + n \\ g(x) = \sqrt{cx+c} = \sqrt{c} = c \end{cases}$$

$$\Rightarrow (f-g)(x) = c + n - c = n = c \Rightarrow \underline{n = c} \quad \left. \begin{aligned} m+n &= \\ \wedge \sqrt{c} + c \end{aligned} \right\}$$