

$$f(x) = \begin{cases} 2x-1 & ; [x] > \varepsilon \rightarrow x > \omega \\ \varepsilon x + 3 & ; [x] \leq \varepsilon \rightarrow x < \omega \end{cases} \quad -1$$

$$y = \sqrt{f(x) - x + 1} \xrightarrow{x > \omega} y = \sqrt{2x-1 - x + 1} = \sqrt{x} \xrightarrow{x \geq 0} \textcircled{1} \cap \textcircled{2} = [\omega, +\infty)$$

$$\xrightarrow{x < \omega} y = \sqrt{\varepsilon x + 3 - x + 1} = \sqrt{\varepsilon x + \varepsilon} \xrightarrow{x \geq -\frac{\varepsilon}{\varepsilon}} \textcircled{1} \cap \textcircled{2} = \left[-\frac{\varepsilon}{\varepsilon}, \omega\right)$$

$$D = \left[-\frac{\varepsilon}{\varepsilon}, \omega\right) \cup [\omega, +\infty) = \left[-\frac{\varepsilon}{\varepsilon}, +\infty\right)$$

$$y = \frac{r\varepsilon x^r + r^2 x^r + 1x + 3}{(\varepsilon x^r + \varepsilon x + 1)^r} = \frac{r(1x^r + 1x^r + 1x + 1)}{(\varepsilon x^r + \varepsilon x + 1)(\varepsilon x^r + \varepsilon x + 1)} = \frac{r(2x^r + 1)(\varepsilon x^r + \varepsilon x + 1)}{(1x + 1)(2x + 1)(\varepsilon x^r + \varepsilon x + 1)} = \frac{r}{2x + 1} \quad -2$$

$$D = \mathbb{R} - \left\{-\frac{1}{r}\right\}$$

در کل مخرج همیشه نقطه $-\frac{1}{r}$ است و همیشه دیگری نداریم.

$$y = \frac{x^r + rx^r - x - r}{x^r - 1} = \frac{(x^r - 1)(x + r)}{(x^r - 1)} = x + r \rightarrow \boxed{C = r} \quad -3$$

$$\begin{aligned} x = 1 &\rightarrow r = \frac{a+r}{1+b} \rightarrow r + rb = a + r \\ x = -1 &\rightarrow 1 = \frac{-a+r}{b-1} \rightarrow b-1 = -a+r \end{aligned} \rightarrow \begin{cases} rb - a = -1 \\ b + a = r \\ \hline \varepsilon b = r \rightarrow \boxed{b = \frac{1}{r}} \end{cases}$$

$$b + c = \frac{1}{r} + r = \frac{\omega}{r}$$

$$f(x) = g(x) \rightarrow \frac{x^r - 1}{x^r + ax + b} = \frac{x+1}{x-c} \Rightarrow g(x) = \frac{(x+1)(x-1)}{(x-c)(x-1)} = f(x) \quad -5$$

$$\rightarrow x^r + ax + b = (x-c)(x-1) \rightarrow x^r + ax + b = x^r + (-1-c)x + c$$

$$\rightarrow a = -1-c, b = c \rightarrow a + b + c = -1 - c + c + c = c - 1$$

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$$\begin{aligned}
 g(x) &= f(x+1) + f(1-x) = (x-1)^r(x) + (-x-1)^r(-x) \\
 &= x(x-1)^r - x(x+1)^r = x[(x-1)^r - (x+1)^r] = x(-1)x^r = -1x^r \\
 \Rightarrow g(x) &= -1x^r
 \end{aligned}$$

$$1 - 2x = -1 \rightarrow 2x = 2 \rightarrow x = 1 \xrightarrow{x > 0} \epsilon \sqrt{1} = \epsilon$$

$$1 - 2x = 3 \rightarrow -2x = 2 \rightarrow x = -1 \xrightarrow{x \leq 0} \sqrt{-1} + 2 = 1$$

$$f(-1) + f(3) = \epsilon + 1 = \epsilon$$

$$\begin{aligned}
 x + \sqrt{x} &= 4 \rightarrow \sqrt{x} = 4 - x \rightarrow x = 16 - 12x + x^2 \rightarrow x^2 - 13x + 16 = 0 \\
 (x-9)(x-4) &= 0
 \end{aligned}$$

$$x = 9 \rightarrow 9 + 3 \neq 4 \quad \text{G.G.E}$$

$$\begin{aligned}
 x = 4 \rightarrow 4 + 2 &= 4 \quad \checkmark \\
 \Rightarrow f(4) &= f(4) + 3(4) = 2 \cdot 4 + 12 = 20
 \end{aligned}$$

$$\begin{aligned}
 f(x-1) + f(1-x) &= (x-1)^3 + (x-1) + (1-x)^3 + (1-x) \\
 &= (x-1)^3 + (x-1) - (x-1)^3 - (x-1) = 0
 \end{aligned}$$

9. اشتراك دامنه f و g فقط 1 بوده است. پس! ريشه دارين كال حالت.

$$\begin{aligned}
 x=1 &\rightarrow \epsilon - 2a = 0 \rightarrow a = \frac{\epsilon}{2} \\
 b - \epsilon &= 0 \rightarrow b = \epsilon \\
 \Rightarrow 2f - g &= 2(K-1) - (2K) = K \rightarrow -2 = 2K \rightarrow K = -1
 \end{aligned}$$

$$2a - \frac{b}{r} - K = 2\left(\frac{\epsilon}{2}\right) - \left(\frac{\epsilon}{2}\right) - (-1) = \epsilon - 2 + 1 = \epsilon$$

و ريشه دارين كال است.

$$D_f \times g = D_f \cap D_g = [-1, \sqrt{2}], g(x) = \sqrt{2x+2} \rightarrow D_g = [-1, +\infty) \Rightarrow D_f = (-\infty, \sqrt{2}]$$

$$f(x) = \sqrt{m-x} + n \rightarrow m-n=0 \rightarrow \boxed{m=n} \quad f(g(2)) = 2\sqrt{2} \rightarrow (2+n) - 2\sqrt{2} = 2\sqrt{2}$$

$$\rightarrow \boxed{n = 2\sqrt{2} - 2} \rightarrow m+n = 2 + 2\sqrt{2} - 2 = 2\sqrt{2}$$

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