

۲. آزمون علی نوستر

ارسیا از در کلاس دهم پسر B

$$f(n) = \begin{cases} (a+1)(n+2); & n > 1 \\ 3a + 2n; & n \leq 1 \end{cases}$$

$$\begin{aligned} 2f(1) &= f(-1) + a \\ \Rightarrow 2(3a+2) &= 3a - 1 + a \\ \Rightarrow 12a + 4 &= 4a - 1 \Rightarrow 10a = -11 \Rightarrow a = -1.1 \end{aligned}$$

$$f(n) = \sqrt{n} + \frac{1}{\sqrt{n}} + 2 \xrightarrow{\text{مخرج مشترک}} \frac{n+1+2\sqrt{n}}{\sqrt{n}} = \frac{(\sqrt{n}+1)^2}{\sqrt{n}}$$

$$\begin{aligned} f(2-\sqrt{3}) + f(2+\sqrt{3}) &= \frac{(\sqrt{2-\sqrt{3}}+1)^2}{\sqrt{2-\sqrt{3}}} + \frac{(\sqrt{2+\sqrt{3}}+1)^2}{\sqrt{2+\sqrt{3}}} \\ \Rightarrow \frac{(2-\sqrt{3} + 2\sqrt{2-\sqrt{3}} + 1)\sqrt{2+\sqrt{3}} + (2+\sqrt{3} + 2\sqrt{2+\sqrt{3}} + 1)\sqrt{2-\sqrt{3}}}{(\sqrt{2-\sqrt{3}})(\sqrt{2+\sqrt{3}})} &= 1 \end{aligned}$$

$$\begin{aligned} \Rightarrow (2-\sqrt{3})\sqrt{2+\sqrt{3}} + (2\sqrt{2-\sqrt{3}})\sqrt{2+\sqrt{3}} + \sqrt{2+\sqrt{3}} + (2+\sqrt{3})\sqrt{2-\sqrt{3}} + (2\sqrt{2+\sqrt{3}})\sqrt{2-\sqrt{3}} \\ + \sqrt{2-\sqrt{3}} = 2\sqrt{4} + 4 \end{aligned}$$

$$\begin{aligned} \left. \begin{aligned} (2f(n) - 3f(-n) &= f(n^2 - n)) \times 1 \\ (2f(-n) - 3f(n) &= f(n^2 + n)) \times 2 \end{aligned} \right\} \Rightarrow \left. \begin{aligned} 2f(n) - 3f(-n) &= 11n^2 - 2n \\ 2f(-n) - 9f(n) &= 12n^2 + 3n \end{aligned} \right\} \Rightarrow -5f(n) = 10n^2 + 5n \\ \Rightarrow f(n) &= -\frac{10n^2 + 5n}{5} \end{aligned}$$

$$(n+2)f(n) - 3nf(n+2) = f(n^2 - mn + 3m - 1)$$

$$\begin{aligned} \Rightarrow (2f(0) = 3m - 1) \Rightarrow f(0) &= \frac{3m-1}{2} \\ \Rightarrow 2f(0) - 3f(0) &= 17 + 2m + 3m - 1 = 14 + 5m \Rightarrow f(0) = \frac{14+5m}{1} \end{aligned}$$

$$f(n) + f\left(\frac{1}{n}\right) = \frac{3n^2 - 12n + 3}{n} \xrightarrow{n=1} 2f(1) = \frac{3-12+3}{1} \Rightarrow f(1) = -3$$

$$-3 = a + b$$

$$f(2) + f\left(\frac{1}{2}\right) = \frac{12 - 24 + 3}{2} = -\frac{9}{2} \Rightarrow f(2) + f\left(\frac{1}{2}\right) = 2a + b + \frac{1}{2}a + b \xrightarrow{a+b=-3} -\frac{3}{2}a - 3 = -\frac{9}{2}$$

$$\Rightarrow a = 2 \Rightarrow b = -5, f(n) = 3n - 5 \Rightarrow f(-1) = -9$$

$$\left\{ \begin{array}{l} f(x) = (x-1)\sqrt{1-x} \\ g(x) = -\sqrt{(1-x)^3} \end{array} \right. \quad \left. \begin{array}{l} Df = Dg = x \leq 1 \\ Rf = Rg \end{array} \right\} \Rightarrow f(x) = g(x) \quad -4$$

$$\left\{ \begin{array}{l} f(x) = x\sqrt{x} \\ g(x) = \sqrt{x^3} \end{array} \right. \quad \left. \begin{array}{l} Df = Dg = x \geq 0 \\ Rf = Rg \end{array} \right\} \Rightarrow f(x) = g(x) \quad -5$$

$$\left\{ \begin{array}{l} f(x) = [\sqrt{x} - [\sqrt{x}]] \\ g(x) = \sqrt{x - [x]} \end{array} \right. \quad \left. \begin{array}{l} x \geq 0 \\ x \geq 0 \end{array} \right\} \quad \left. \begin{array}{l} Df = Dg \\ R_f \neq R_g \end{array} \right\} \Rightarrow f(x) = g(x) \quad -1$$

$$\text{الف) } \left(\frac{f+g}{f-g} \right)^{(1)} = \frac{x}{x} = 1 \quad \text{ب) } \left(\frac{f+g}{f-g} \right)^{(2)} = \frac{1}{0} \quad \text{ج) } f(0)g(-1) = 0 \times 1 = 0$$

$$\text{الف) } g(x) = f(3x-1) \Rightarrow g(x) = \left\{ (1,1) (0,1) (1,0) \left(-\frac{1}{3}, 2\right) \left(\frac{x}{3}, 9-1\right) \right\}$$

$$\text{ب) } h(x) = f(|x|) \Rightarrow h(x) = \left\{ (1,1) (-1,1) (0,0) (1,1) (-1,1) \right\}$$

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