

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

$$f(2) = f(-2) + a \rightarrow a = ? \quad f(a+1) = (3a-4) + a$$

$$1 \cdot (3a+1) = 3a-4$$

$$1 \cdot a = -1 \Rightarrow a = \frac{-1}{1} = -1$$

$$f(2) = (a+1)(2+2) = 4(a+1) \sim f(2) = 1 \cdot f(a+1)$$

$$f(-2) = 2a+2(-2) = 2a-4$$

$$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + 2$$

$$f(2-\sqrt{3}) + f(2+\sqrt{3}) = ? \rightarrow 2\sqrt{9} + 4$$

$$S \cdot \sqrt{S} = (2-\sqrt{3})(2+\sqrt{3}) = 1 \sim \sqrt{S} = \frac{1}{\sqrt{S}} \Rightarrow f(S) + f(\sqrt{S}) = \sqrt{S} + \frac{1}{\sqrt{S}} + 2 + \frac{1}{\sqrt{S}} + 2$$

$$\frac{1}{\sqrt{S}} = \sqrt{S} \Rightarrow \sqrt{S} = 1 \Rightarrow 2\sqrt{S} + 2\sqrt{S} + 4 = 2(\sqrt{S} + \sqrt{S}) + 4 = 2(2) + 4 = 8$$

$$* (\sqrt{S} + \sqrt{S})^2 = S + S + 2\sqrt{S} \cdot \sqrt{S} = 2 + 2 + 2\sqrt{S} \cdot \sqrt{S} = 4 + 2\sqrt{S} \cdot \sqrt{S} = 4 + 2 \cdot 1 = 6 \rightarrow \sqrt{S} + \sqrt{S} = \sqrt{6} \quad \sqrt{S} \cdot \sqrt{S} = 1$$

$$f(x) = ?$$

$$f(x) - f(-x) = f(x^2 - x)$$

$$\begin{cases} f(x) - f(-x) = f(x^2 - x) \\ f(x) - f(-x) = f(x^2 - x) \end{cases} \Rightarrow \begin{cases} f(x) - f(-x) = f(x^2 - x) \\ f(x) - f(-x) = f(x^2 - x) \end{cases}$$

$$f(x) = -x^2 - \frac{1}{2}x$$

$$(x+1)f(x) - x f(x+2) = f(x^2 - mx + m - 1)$$

$$f(0) = ?$$

$$x=0 \rightarrow f(0) = m-1 \rightarrow f(0) = \frac{m-1}{2} \Rightarrow \frac{m-1}{2} = \frac{m-1}{2} \Rightarrow m-1 = m-1$$

$$x=-2 \rightarrow f(0) = 19 + 2m - 1 \rightarrow f(0) = \frac{19 + 2m}{2} \Rightarrow \frac{19 + 2m}{2} = \frac{m-1}{2} \Rightarrow 19 + 2m = m-1 \Rightarrow m = -20$$

$$\sim f(0) = \frac{19 + 2(-20)}{2} = \frac{19 - 40}{2} = \frac{-21}{2} \Rightarrow f(0) = -\frac{21}{2}$$

$$f(x) + f\left(\frac{1}{x}\right) = \frac{x^2 - 12x + 12}{x}$$

$$f(-1) = ? \rightarrow f(-1) = -9$$

$$f(x) = ax + b$$

$$f(x) + f\left(\frac{1}{x}\right) = ax + b + \frac{a}{x} + b = \frac{ax^2 + a + bx^2 + bx^2 + b}{x} = \frac{(a+b)x^2 + (a+b)x + a}{x}$$

$$f(x) = ax + b$$

$$f\left(\frac{1}{x}\right) = \frac{a}{x} + b$$

$$\sim f(x) = 3x - 9 \sim f(-1) = 3(-1) - 9 = -12$$

$$\begin{cases} f(x) = (x-1)\sqrt{1-x} \\ g(x) = -\sqrt{(1-x)^3} \end{cases}$$

سین و این تابع

① $f(x) : 1-x \geq 0 \rightarrow x \leq 1$ $g(x) : 1-x \geq 0 \rightarrow x \leq 1$

② $f(x) : (x-1)\sqrt{1-x}$ $g(x) : -\sqrt{(1-x)^3}$ $\rightarrow (1-x)\sqrt{1-x} = (x-1)\sqrt{1-x}$

$$\begin{cases} f(x) = x\sqrt{x} \\ g(x) = \sqrt{x^3} \end{cases}$$

سین این تابع با هم مساوی است

① $f(x) : x \geq 0$ $g(x) : x \geq 0$

② $f(x) : x\sqrt{x}$ $g(x) : \sqrt{x^3} \rightarrow |x|\sqrt{x} \rightarrow x\sqrt{x}$

$$\begin{cases} f(x) = [\sqrt{x} - \lfloor \sqrt{x} \rfloor] \\ g(x) = \sqrt{x - |x|} \end{cases}$$

این تابع با این تابع هم مساوی است و هم ضابطه آن ها یکسان است

$f(x) : [\sqrt{x} - \lfloor \sqrt{x} \rfloor]$ $g(x) : \sqrt{x - |x|}$ $\rightarrow \sqrt{x} - n < 1 \rightarrow \sqrt{x} - n \geq 0 \rightarrow x - |x| \geq 0$

$f = \{(1,2), (2,3), (3,1), (0,0)\}$ $g = \{(-1,1), (1,1), (2,2), (3,3), (0,0), (\sqrt{2},1)\}$

$\left(\frac{f+g}{f-g}\right)(1) \xrightarrow{x=1} \left\{ \begin{matrix} f(1)=2 \\ g(1)=1 \end{matrix} \right\} \rightarrow \frac{f(1)+g(1)}{f(1)-g(1)} = \frac{2+1}{2-1} = 3$

$\left(\frac{f+g}{f-g}\right)(2) \xrightarrow{x=2} \left\{ \begin{matrix} f(2)=3 \\ g(2)=2 \end{matrix} \right\} \rightarrow \frac{f(2)+g(2)}{f(2)-g(2)} = \frac{3+2}{3-2} = 5$

$f(0)g(-1) \rightarrow \left\{ \begin{matrix} f(0)=0 \\ g(-1)=1 \end{matrix} \right\} \rightarrow f(0)g(-1) = 0$

$f(x) = \{(2,1), (-1,4), (0,5), (-2,2), (3,-1)\}$ $g = \{(1,1), (0,4), (\frac{1}{2},2), (\frac{1}{3},3), (-1,1)\}$

$g(x) = f(3x-1)$ $\rightarrow \begin{cases} 3x-1=2 \rightarrow x=1 \rightarrow g(1)=f(2)=1 \\ 3x-1=-1 \rightarrow x=0 \rightarrow g(0)=f(-1)=4 \\ 3x-1=0 \rightarrow x=\frac{1}{3} \rightarrow g(\frac{1}{3})=f(0)=5 \\ 3x-1=-2 \rightarrow x=-\frac{1}{3} \rightarrow g(-\frac{1}{3})=f(-2)=2 \\ 3x-1=3 \rightarrow x=\frac{4}{3} \rightarrow g(\frac{4}{3})=f(3)=-1 \end{cases}$

$h(x) = f(|x|)$

$\{ -2, -1, 2, 3 \}$ $\rightarrow \{ 2, 1, 2, 3 \}$ $\rightarrow \{ f(2), f(1), f(2), f(3) \} = \{ 1, 4, 1, -1 \}$

$h = \{ (-3,-1), (-2,1), (0,5), (2,1), (3,-1) \}$