

$$f(x) = \begin{cases} (x+1)(x+2) & x > 1 \\ 2x+2 & x \leq 1 \end{cases} \Rightarrow f(\omega) = f(-2) + \alpha = 2((x+1)(2)) = 2x + 2(-2) + \alpha \Rightarrow 10\alpha = -11 \Rightarrow \alpha = \frac{-11}{10} = \frac{-9}{10}$$

$$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + 2 \left\{ f(2-\sqrt{3}) + f(2+\sqrt{3}) \right\} = \sqrt{2-\sqrt{3}} + \frac{1}{\sqrt{2-\sqrt{3}}} + 2 + \sqrt{2+\sqrt{3}} + \frac{1}{\sqrt{2+\sqrt{3}}} + 2 = \frac{(2-\sqrt{3})(\sqrt{2+\sqrt{3}}) + \sqrt{2+\sqrt{3}} + (2+\sqrt{3})(\sqrt{2-\sqrt{3}}) + \sqrt{2-\sqrt{3}}}{\sqrt{(2-\sqrt{3})(2+\sqrt{3})}} + 4 = \frac{\sqrt{(2-\sqrt{3})(2+\sqrt{3})} + \sqrt{(2-\sqrt{3})(2+\sqrt{3})} + 4}{\sqrt{(2-\sqrt{3})(2+\sqrt{3})}} + 4 = \frac{2\sqrt{(2-\sqrt{3})(2+\sqrt{3})} + 4}{\sqrt{(2-\sqrt{3})(2+\sqrt{3})}} + 4 = \frac{2\sqrt{4} + 4}{\sqrt{4}} + 4 = \frac{2 \cdot 2 + 4}{2} + 4 = \frac{4+4}{2} + 4 = 4 + 4 = 8$$

$$2f(x) - 3f(-x) = (2x^2 - x) \left\{ \begin{aligned} 2f(x) - 3f(-x) &= 2x^2 - x \\ 2f(-x) - 3f(x) &= 2x^2 + x \end{aligned} \right\} \Rightarrow -\omega f(x) = 2x^2 - x \Rightarrow f(x) = -\frac{2x^2 - x}{\omega}$$

$$(x+2)f(x) - 3xf(x+2) = (2x^2 - m)x + 2m - 1 \left\{ \begin{aligned} x=0 &\Rightarrow (0+2)f(0) + 0 = 2m - 1 \Rightarrow f(0) = \frac{1-m}{2} \\ x=2 &\Rightarrow (2+2)f(2) - 6f(0) = 1/2 + 2m + 2m - 1 \Rightarrow 11 - 4m = 0 \Rightarrow m = \frac{11}{4} \end{aligned} \right\} \Rightarrow f(0) = \frac{2\omega}{5}$$

$$f(x) + f\left(\frac{1}{x}\right) = \frac{2x^2 - 12x + 3}{x} \Rightarrow ax^2 + b + \frac{a}{x} + b = \frac{2x^2 - 12x + 3}{x} \Rightarrow ax^2 + 2bx + a = 2x^2 - 12x + 3 \Rightarrow \begin{cases} a=2 \\ b=-6 \end{cases} \Rightarrow f(x) = 2x - 6 \Rightarrow -9 = f(-1)$$

$$f(x) = (x-1)\sqrt{1-x} \Rightarrow D_f = \{x \mid 1-x \geq 0\} \Rightarrow x \leq 1 \Rightarrow D_f = D_g \left\{ \begin{aligned} f(x) &= \sqrt{-(1-x)^2(1-x)} = -\sqrt{(1-x)^3} \\ g(x) &= -\sqrt{(1-x)^3} \end{aligned} \right\} \Rightarrow f(x) = g(x)$$

اگر چند عدد را انتخاب کنیم نتیجه‌ی گنبدیم که خروجی‌ها برابر بوده و ضابطه‌ها یکسان عمل می‌کنند

$$f(x) = x\sqrt{x} \Rightarrow D_f = \{x \mid x \geq 0\} \Rightarrow D_f = D_g \left\{ \begin{aligned} f(x) &= \sqrt{x(x^2)} = \sqrt{x^3} \\ g(x) &= \sqrt{x^3} \end{aligned} \right\} \Rightarrow f(x) = g(x)$$

اگر چند عدد را انتخاب کنیم خروجی‌ها برابر می‌شود در نتیجه ضابطه‌ها یکسان عمل می‌کنند

$$f(x) = \lfloor \sqrt{x} \rfloor - \lfloor \sqrt{x} \rfloor \Rightarrow D_f = \{x \mid x \geq 0\} \Rightarrow D_f = D_g \left\{ \begin{aligned} f(x) &= \lfloor \sqrt{x} \rfloor - \lfloor \sqrt{x} \rfloor = 0 \\ g(x) &= \sqrt{x} - |x| \Rightarrow D_g = \{x \mid x - |x| \geq 0 \Rightarrow x \geq |x| \Rightarrow x \geq 0\} \end{aligned} \right\} \Rightarrow f(x) = g(x)$$

چون عدد صحیح است از بزرگت آن را خارج می‌کنیم

ضابطه‌ها یکسان عمل می‌کنند

$$f = \{(1, 2), (2, 3), (3, 1), (0, 0)\} \quad g = \{(-1, 1), (1, 1), (2, 3), (3, \infty), (0, 2), (\sqrt{7}, 1)\}$$

الف)  $\left(\frac{f+g}{f-g}\right)(1) = \frac{f(1)+g(1)}{f(1)-g(1)} = \frac{2+1}{2-1} = \boxed{3}$  ب)  $\left(\frac{f+g}{f-g}\right)(2) = \frac{f(2)+g(2)}{f(2)-g(2)} = \frac{3+3}{3-3} \Rightarrow$  تعریف نشده، غرق

ج)  $f(0)g(-1) = 0 \times 1 = \boxed{0}$

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

الف)  $g(x) = f(3x-1) \Rightarrow \left. \begin{array}{l} 3x-1=2 \Rightarrow x=1 \\ 3x-1=0 \Rightarrow x=\frac{1}{3} \\ 3x-1=-1 \Rightarrow x=0 \\ 3x-1=4 \Rightarrow x=\frac{5}{3} \end{array} \right\} \Rightarrow g(x) = \{(1, 1), (0, 4), (\frac{1}{3}, \infty), (\frac{5}{3}, -1)\}$

ب)  $h(x) = f(|x|) \Rightarrow \left. \begin{array}{l} |x|=2 \Rightarrow x=\pm 2 \\ |x|=0 \Rightarrow x=0 \\ |x|=3 \Rightarrow x=\pm 3 \end{array} \right\} \Rightarrow g(x) = \{(2, 1), (-2, 1), (0, \infty), (3, -1), (-3, -1)\}$