

DATE:

SUBJECT:

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

$$f(x) = f(-x) + a$$

$$x > 1 \rightarrow f(x) = (a+1)(x) = xa + x$$

$$-x \leq 1 \rightarrow f(-x) = 3a + 2(-x) = 3a - 2x$$

$$f(x) = f(-x) + a \rightarrow xa + x = 3a - 2x + a$$

$$1xa - 2a = -1a$$

$$10a = -1a \rightarrow a = -1, 1$$

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

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

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

$$\text{سو } t = \sqrt{x - \sqrt{x}}$$

$$\frac{1}{t} = \sqrt{x + \sqrt{x}}$$

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

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

$$2 \rightarrow x(t + \frac{1}{t} + 2)$$

$$t + \frac{1}{t} = \sqrt{x - \sqrt{x}} + \sqrt{x + \sqrt{x}} \xrightarrow{\text{مربع}} (x - \sqrt{x}) + (x + \sqrt{x}) + 2\sqrt{x} = 4$$

$$\text{جواب آخر } \boxed{4 + 2\sqrt{x}} \quad t + \frac{1}{t} = \sqrt{4}$$

$$x < 0, x \rightarrow f(-x) - 3f(x) = 2x^2 + x$$

$$\begin{cases} f(x) - 3f(-x) = 2x^2 - x \\ -3f(x) + f(-x) = 2x^2 + x \end{cases}$$

$$\begin{cases} 2x^2 - x \\ 2x^2 + x \end{cases}$$

$$\begin{cases} 2x^2 - 4x = 1x^2 - 2x \\ -4x^2 + 4x = 1x^2 + 2x \end{cases}$$

$$\begin{cases} -4x^2 + 4x = 1x^2 + 2x \\ -4x^2 + 4x = 1x^2 + 2x \end{cases}$$

$$-5f(x) = 1x^2 + x$$

$$f(x) = -\frac{1}{5}x^2 - \frac{x}{5}$$

$$n=3, \quad 4f(0) = 4m-1 \rightarrow f(0) = \frac{4m-1}{4}$$

$$n=4, \quad 7f(0) = 4 + 4m + 4m-1 \rightarrow 7f(0) = 1 + 4m$$

$$\text{از طرفی} \rightarrow 7f(0) = 4(4m-1) = 16m-4$$

$$\text{پس} \rightarrow 16m-4 = 1 + 4m$$

$$12m = 5$$

$$m = \frac{5}{12}$$

$$f(0) = \frac{4\left(\frac{5}{12}\right) - 1}{4}$$

$$= \frac{\frac{20}{12} - 1}{4} = \frac{\frac{8}{12}}{4} = \frac{2}{3} = f(0)$$

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

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

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

$$= ax + b + \frac{a}{x}$$

$$\frac{4x^4(4x+3)}{x} = 4x - 1 + \frac{4}{x}$$

$$4x + \frac{4}{x} - 1 = ax + b + \frac{a}{x}$$

$$\text{پس} \rightarrow a = 4$$

$$4b = -1 \rightarrow b = -\frac{1}{4}$$

$$f(x) = 4x - \frac{1}{4}$$

$$f(-1) = 4(-1) - \frac{1}{4} = -\frac{17}{4}$$

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

$$g(x) = -\sqrt{(1-x)^3}$$

برای $f(x)$ و $g(x)$ هر دو
در بازه $[0, 1]$ تعریف شده اند

$$1-x \geq 0 \rightarrow x \leq 1$$

$$D_g = (-\infty, 1]$$

$$D_f = (-\infty, 1]$$

$$D_g = D_f$$

$$g(x) = (x-1)\sqrt{1-x}$$

$$g(x) = f(x)$$

$$\begin{cases} f(x) = x\sqrt{x} \rightarrow x > 0 \\ g(x) = \sqrt{x^3} \end{cases}$$

سین هر دو تابع هم دامنه
و هم ضابطه یکسان

$x > 0$

$$\sqrt{x^3} = x^{\frac{3}{2}}$$

$$\sqrt{x^3} = x^{\frac{3}{2}}$$

$$Df = Dg$$

$$f(x) = g(x)$$

$$\begin{cases} f(x) = [\sqrt{x} - [\sqrt{x}]] \rightarrow x > 0 \\ g(x) = \sqrt{x - |x|} \end{cases}$$

$$[\sqrt{x}] \in \sqrt{x} \text{ یعنی } \sqrt{x} - [\sqrt{x}] = 0$$

$$Df = [0, +\infty)$$

$$Rf = \{0\} \text{ چون هر دو خروجی صفر است}$$

$$|x| = x \text{ اگر } x \geq 0$$

$$g(x) = \sqrt{x - x} = 0$$

$$|x| = -x \text{ اگر } x < 0$$

$$x - |x| = x - (-x) = 2x$$

$$2x < 0 \text{ چون } x < 0$$

بنابراین تعریف نشده است

$$Dg = [0, +\infty)$$

$$Rg = \{0\}$$

$$\left(\frac{f+g}{f-g} \right)(1) \rightarrow \frac{f(1)+g(1)}{f(1)-g(1)} = \frac{1+1}{1-1} = \frac{2}{0} = \text{تعریف نشده}$$

$$\Rightarrow \left(\frac{f+g}{f-g} \right)(x) \rightarrow \frac{f(x)+g(x)}{f(x)-g(x)} = \frac{x+x}{x-x} = \frac{2x}{0} = \text{تعریف نشده}$$

$$c) f(0)g(-1) \rightarrow \frac{f(0)=0}{g(-1)=1} \rightarrow 0 \times 1 = 0$$

برای به دست آوردن تابع معکوس f^{-1} از $f(x) = 3x - 1$ داریم:

$$\text{if } 3x - 1 = y \rightarrow 3x = y + 1$$

$$x = 1 \quad g(1) = f^{-1}(y) = 1$$

$$\text{if } 3x - 1 = -1 \rightarrow 3x = 0$$

$$x = 0 \quad g(0) = f^{-1}(-1) = 0$$

$$\text{if } 3x - 1 = 0 \rightarrow 3x = 1$$

$$x = \frac{1}{3}$$

$$g\left(\frac{1}{3}\right) = f^{-1}(0) = \frac{1}{3}$$

$$\text{if } 3x - 1 = -2 \rightarrow 3x = -1$$

$$x = -\frac{1}{3}$$

$$g\left(-\frac{1}{3}\right) = f^{-1}(-2) = -\frac{1}{3}$$

$$\text{if } 3x - 1 = 2 \rightarrow 3x = 3$$

$$x = 1$$

$$g(2) = f^{-1}(3) = 1$$

$$\text{then } g = \{(1, 1), (0, 0), \left(\frac{1}{3}, \frac{1}{3}\right), \left(-\frac{1}{3}, -\frac{1}{3}\right), (1, 2)\}$$

$$\text{b) } D_f = \{-2, -1, 0, 1, 2, 3\}$$

مجموعه مقادیر x که در دامنه D_f قرار دارند

مجموعه مقادیر y که در دامنه D_f قرار دارند

$$x = 0 : |x| = 0 \text{ برای}$$

$$h(0) = f(0) = \frac{1}{3}$$

$$x = \pm 1 : |x| = 1 \text{ برای}$$

$$h(\pm 1) = f(1) = 2$$

$$x = \pm 2 : |x| = 2 \text{ برای}$$

$$h(\pm 2) = f(2) = 5$$

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