

$$f(x) \rightarrow x > 1, (x+1)(x+1) \Rightarrow f(x) = (x+1)(x) = x^2 + x \quad -1$$

$$f(-x) \rightarrow x \leq 1, x^2 + x \Rightarrow f(-x) = x^2 + x(-x) = x^2 - x$$

$$f(x^2 + x) = x^2 - x + x \Rightarrow 1 \cdot x + 1 \cdot x = x^2 - x \Rightarrow 2x = -x$$

$$\Rightarrow x = -1, 1$$

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

$$= \sqrt{x+\sqrt{x}} + \frac{1}{\sqrt{x+\sqrt{x}}} + 1 = \sqrt{x+\sqrt{x}} + \frac{1}{\sqrt{x+\sqrt{x}}} + 1 = \sqrt{4} + 1 = 3$$

$$\xleftarrow{f(x-\sqrt{x})} \sqrt{x-\sqrt{x}} + \frac{1}{\sqrt{x-\sqrt{x}}} + 1 = \sqrt{x-\sqrt{x}} + \frac{1}{\sqrt{x-\sqrt{x}}} + 1 = \sqrt{4} + 1 = 3$$

$$(\sqrt{x-\sqrt{x}} + \sqrt{x+\sqrt{x}})^2 = x - \sqrt{x} + x + \sqrt{x} + 2\sqrt{1} = 4 \Rightarrow \sqrt{4} = 2$$

$$\boxed{f(x) = 2\sqrt{4} + 1}$$

$$x \rightarrow (x^2 f(x) - x^2 f(-x)) = (x^2 - x) \cdot x \Rightarrow x^2 f(x) - x^2 f(-x) = 1 \cdot x^2 - x^2$$

$$-x \rightarrow (x^2 f(-x) - x^2 f(x)) = (x^2 + x) \cdot x \Rightarrow x^2 f(-x) - x^2 f(x) = 1 \cdot x^2 + x^2$$

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

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

$$0 \rightarrow x f(0) - 0 = 0 + x m - 1 \Rightarrow f(0) = \frac{x m - 1}{x} \quad -5$$

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

$$\frac{x m - 1}{x} = \frac{1 + x m}{2} \xrightarrow{x(2)} 2m - 2 = 1 + 2xm \Rightarrow 2m = 1 + 2xm \Rightarrow m = 1 \Rightarrow m = \frac{1}{2}$$

$$f(0) = \frac{x m}{x} - \frac{1}{x} = \frac{x}{x} \times \frac{1}{2} - \frac{1}{x} = \boxed{\frac{1}{2} - \frac{1}{x}}$$

$$ax + b + \frac{a}{x} + b = \frac{x^2 - 1}{x} \xrightarrow{x(x)} ax^2 + bx + a + bx = x^2 - 1 \quad -6$$

$$a = 1, b = -1$$

ضرایب a, b و مقادیر a, b باید در طرفین یکسان باشد.

$$f(x) = x^2 - 1 \quad x = -1 \Rightarrow -1 - 1 = \boxed{-2}$$

$\begin{cases} f(x) = (x-1)\sqrt{1-x} \rightarrow x \leq 1 \rightarrow x=0 \Rightarrow \textcircled{-1} \\ g(x) = -\sqrt{(1-x)^3} \end{cases}$
 $D_f = D_g \Rightarrow$ برابر هستند
 $x \leq 1 \Rightarrow -\sqrt{(1-x)^3} = -\sqrt{(1-x)^3} \Rightarrow 1-x \geq 0 \Rightarrow x \leq 1$
 $x=0 \Rightarrow -\sqrt{1} = \textcircled{-1}$

$\begin{cases} f(x) = x\sqrt{x} \rightarrow x \geq 0 \\ g(x) = \sqrt{x^3} \end{cases}$
 $D_f = [0, +\infty)$
 $x=2 \Rightarrow f(x) = 2\sqrt{2}$
 $g(x) = \sqrt{x^3} = 2\sqrt{2}$
برابرند

$\begin{cases} f(x) = [\sqrt{x}] - [\sqrt{x}] \\ g(x) = \sqrt{x} - |x| \end{cases}$
 $D_f = [0, +\infty)$
 $[x] - [x] = 0$
 $\sqrt{x} - |x|$
برابرند

$f+g = \{(0,2), (1,3), (2,4), (3,4)\}$
 $f-g = \{(0,-1), (1,1), (2,0), (3,-1)\}$
 $\left(\frac{f+g}{f-g}\right) = \{(0, -\frac{1}{2}), (1, \frac{3}{2}), (2, \frac{4}{1})\}$
 $= \{(0, -1), (1, 3), (2, -\frac{1}{2})\}$

الف) $\left(\frac{f+g}{f-g}\right)(1) = \boxed{3}$
 ب) $\left(\frac{f+g}{f-g}\right)(1) = \text{تعریف نشده}$
 ج) $f(0)g(0) = 0 \times 1 = \boxed{0}$

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

ب) $h(x) = f(|x|)$
 $|x|=2 \Rightarrow x=\pm 2, |x|=1 \Rightarrow x=\pm 1, |x|=0 \Rightarrow x=0$
 $|x|=-2 \Rightarrow x=\pm 2, |x|=3 \Rightarrow x=\pm 3$
 $h(x) = \{(-2,1), (2,1), (0,0), (-3,-1), (3,-1)\}$