

$f(x) = x \Rightarrow [0, +\infty)$ $g(x) = x \Rightarrow \mathbb{R}$	$f(x) = \frac{r \sin x - r \sin x}{r \sin x - r} = r \sin x$ (ج) $g(x) = r \sin x$ برابر هستند	۱
$f(x) = \frac{(x+r)(x+1)+x+r}{x^2+2x+r} = \frac{x^2+2x+r}{x^2+2x+r} = 1$ $g(x) = 1$	$f(x) = \frac{x}{ x } \Rightarrow \mathbb{R} - \{0\}$ (د) $g(x) = \frac{ x }{x} \Rightarrow \mathbb{R} - \{0\}$ برابر هستند	۱
$f(x) = \mathbb{R} \Rightarrow x^2+1 \neq 0 \Rightarrow 0 \leq \frac{x^2}{x^2+1} < 1$ $g(x) = \mathbb{R} \Rightarrow 0 \leq [x - [x]] < 1$	$f(x) \Rightarrow x - x > 0 \Rightarrow x \geq 0 \Rightarrow x = x$ تن $g(x) \Rightarrow x - x > 0 \Rightarrow x \geq 0 \Rightarrow x = x$ تن $D_g = (-\infty, 0) \Rightarrow x < 0$ برابر نیست	۲
$f(x) [2x] \neq 0 \Rightarrow x < 0 \leq x \leq \frac{1}{2} \Rightarrow (-\infty, 0) \cup [\frac{1}{2}, +\infty)$ $g(x) [x] \neq 0 \Rightarrow x < 0 \leq x \leq 1 \Rightarrow (-\infty, 0) \cup [1, +\infty)$	$f(x) \Rightarrow \frac{0}{-2} \Rightarrow D_f = \mathbb{R}$ $g(x) \Rightarrow \frac{0}{-1} \Rightarrow D_g = \mathbb{R}$	۲
$f(x) + g(x) = x^2 + x + 1 \Rightarrow 2f(x) = 2x^2 + 2 \Rightarrow f(x) = \frac{2x^2 + 2}{2} \Rightarrow f(x) = x^2 + 1$ $f(x) - g(x) = x^2 - x + 1 \Rightarrow 2g(x) = 2x \Rightarrow g(x) = x \Rightarrow f'(x) - g'(x) = (2x)(2x) = 4x^2$ $f'(x) - g'(x) = (x^2 - x + 1)(x^2 + x + 1) \Rightarrow ((x^2 + 1) - x)((x^2 + 1) + x) = (x^2 + 1)^2 - x^2 \Rightarrow x^4 + 2x^2 + 1 - x^2 \Rightarrow x^4 + x^2 + 1$ $f(x) = x^2 + 1 \quad g(x) = x \quad f'(x) - g'(x) = x^4 + x^2 + 1$		
$f(x) = x - \sqrt{x^2 - 4} \Rightarrow f \cdot g = (x - \sqrt{x^2 - 4})(x + \sqrt{x^2 - 4}) = x^2 - (\sqrt{x^2 - 4})^2 = x^2 - x^2 + 4 = 4$ $g(x) = x + \sqrt{x^2 - 4}$ $x^2 - 4 \geq 0 \Rightarrow (x-2)(x+2) \Rightarrow x \geq 2 \vee x \leq -2$		
$f(x) = \frac{ax+r}{x^2-mx+n} = \frac{ax+r}{x^2-mx+n} \Rightarrow x-b = \frac{1}{a}(ax+r) = x + \frac{r}{a} \Rightarrow -b = \frac{r}{a} \Rightarrow b = -\frac{r}{a}$ $g(x) = \frac{x-b}{r^2-rx-a} = \frac{x-b}{(r^2-rx-a)(x+1)} \Rightarrow (r^2-rx-a)(x+1) = \frac{1}{a}(x^2-mx+n) \Rightarrow rx^2-rx-a = \frac{1}{a}x^2 - \frac{m}{a}x + \frac{n}{a}$ $\frac{1}{a}x^2 - \frac{m}{a}x + \frac{n}{a} \Rightarrow r = \frac{1}{a} \Rightarrow a = \frac{1}{r} \Rightarrow -r = -\frac{m}{a} = m = ra \Rightarrow m = \frac{r}{r} = 1$ $-a = \frac{n}{a} \Rightarrow a = -\frac{n}{a} \Rightarrow ab = -r \Rightarrow b = -\frac{r}{a} = -\frac{r}{1/r} = -r^2$		

$$bx + y = y(\lambda x + b) \Rightarrow bx + y = \lambda xy + by \Rightarrow b = \lambda y \neq by = y \Rightarrow y = \frac{b}{\lambda}$$

$$y = \left(\frac{b}{\lambda}\right)b \Rightarrow y = \frac{b^2}{\lambda} \Rightarrow b^2 = 14 \Rightarrow \boxed{b = \pm \sqrt{14}} \xrightarrow{b \neq 0} y = \pm \frac{1}{\sqrt{14}}, c = \pm \frac{1}{\sqrt{14}}$$

$$\xrightarrow{b = -\sqrt{14}} y = -\frac{1}{\sqrt{14}}, c = -\frac{1}{\sqrt{14}} \xrightarrow{x=a} \lambda a + b = 0 \Rightarrow \lambda a - \sqrt{14} = 0 \Rightarrow a = \frac{\sqrt{14}}{\lambda}$$

$$c = -\frac{1}{\sqrt{14}}, a = \frac{1}{\sqrt{14}}$$

$$b = -\sqrt{14} \text{ (2)}$$

$$c = \frac{1}{\sqrt{14}}, a = -\frac{1}{\sqrt{14}}, b = \sqrt{14} = \textcircled{1}$$

$$\frac{ab}{c} = \frac{\frac{1}{\sqrt{14}} \times -\sqrt{14}}{-\frac{1}{\sqrt{14}}} = -1 \times -1 = \boxed{1}$$

$$\frac{ab}{c} = \frac{-\frac{1}{\sqrt{14}} \times \sqrt{14}}{\frac{1}{\sqrt{14}}} = -1 \times 1 = \boxed{-1}$$

$$(-1, 1) = f(-1) = \frac{1+1}{1} = 2$$

$$f(x) = \{(-1, 2)(2, 1)(1, -1)(0, \frac{1}{2})\} \Rightarrow D_f = \{-1, 2, 1, 0\}$$

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

$$g = \{(2, 1)(1, 2)(-1, -1)(0, 0)\} \Rightarrow D_g = \{2, 1, -1, 0\}$$

$$(1, -1) = f(1) = \frac{-1+1}{1} = 0$$

$$f+g = \{(-1, 2)(2, 1)(1, 2)\}$$

$$(0, 0) = f(0) = \frac{1}{2}$$

$$\frac{fg}{f+g} = \{(-1, 2)(2, 1)(1, 2)\}$$

$$f, 1, 2 = \frac{fg}{f+g}$$

$$f = \{(r, a)(-r, ra - rb)(c, a)(r, d)\}$$

$$g = \{(r, -1)(-r, 1)(a - rb, a)\}$$

$$\Rightarrow (r, a) = (r, -1) \Rightarrow \boxed{a = -1} = (r, d) \Rightarrow \boxed{d = -1}$$

$$(-r, ra - rb) = (-r, -1) \Rightarrow -r - rb = -1 \Rightarrow -r(1+b) = -1 \Rightarrow 1+b = \frac{1}{r} \Rightarrow b = \frac{1}{r} - 1$$

$$\boxed{b = -r} \Rightarrow (a - rb, a) = (c, a) \Rightarrow -1 + r = c \Rightarrow \boxed{c = r - 1}$$

$$d + c = -1 + r = \boxed{r}$$

داده تابع $g(x)$ شامل یک نقطه است، $g(x)$ فقط برای $x=a$ تعریف شود، $f(x) = \sqrt{-x^2 + x - m} \Rightarrow -x^2 + x - m \geq 0$

$$-x^2 + x - m = 0 \Rightarrow b^2 - 4ac \Rightarrow 1 - 4m = 0 \Rightarrow 4m = 1 \Rightarrow m = \frac{1}{4} \Rightarrow -x^2 + x - \frac{1}{4} = 0$$

$$\Rightarrow -(x^2 - x + \frac{1}{4}) \Rightarrow (x - \frac{1}{2})^2 = 0 \Rightarrow \boxed{x = \frac{1}{2}, a = \frac{1}{2}} \Rightarrow f(\frac{1}{2}) = \sqrt{-\frac{1}{4} + \frac{1}{2} - \frac{1}{4}} = \sqrt{0}$$

$$\Rightarrow \boxed{b = 0} \Rightarrow a + b = \frac{1}{2} + 0 = \boxed{\frac{1}{2}}$$

$$\frac{rx+a}{x^2+4x+b} = \frac{r}{x-c} \Rightarrow (rx+a)(x-c) = r(x^2+4x+b) \Rightarrow rx^2 - rcx + ax - ac = rx^2 + 4rx + rb$$

$$\Rightarrow rx^2 + \underbrace{(a-rc)}_{1r}x - \underbrace{ac}_{rb} = rx^2 + 4rx + rb \Rightarrow a-rc = 4, -ac = rb \Rightarrow g(x) = x \neq c, f(x) = x^2 + 4x + b$$

$$x^2 + 4x + b = (x-c) \Rightarrow \frac{r}{x-c} = \frac{r(x-c)}{(x-c)^2} = \frac{rx - rc}{x^2 - rcx + c^2} \Rightarrow x^2 + 4x + b = (x-c)(x-c) = (x-c)^2$$

$$= x^2 - rcx + c^2 \Rightarrow -rc = 4 \Rightarrow \boxed{c = -4} \Rightarrow c^2 = b \Rightarrow \boxed{b = 16}, a - rc = 4 \Rightarrow \boxed{a = 0}$$

$$4 + 4 + -4 = \boxed{4}$$