الف) $x \in R$ $x \geq 0$ | $x \in R$ | نیست ✗

ب) $x^2 + 3x + 7 \neq 0$
$\Delta = b^2 - 4ac$ ریشه ندارد
$25 - 28 = -3$
$x \in R$ | ثابت همیشه ۱ = | هست ✓

ج) $2 \sin x \neq 3$
$\sin x \neq \frac{3}{2}$
$x \in R$ | $x \in R$ | هست ✓

د) $|x| \neq 0$
$x \neq 0$ | $x \neq 0$ | ثابت همیشه یکسان | هست ✓

②

الف) $x^2 + 1 \neq 0$
$x^2 \neq -1 \rightarrow$ امکان نداره
همیشه
$x \in R$

$x - [x] \overset{\in Z}{\not\in} 0$ برابر است با $\rightarrow = 0$
$\not\in Z \rightarrow [0, 1)$ | هست ✓

ب) $[2x] \neq 0$
$Df = x \neq [0, 0.5)$

$2[x] \neq 0$
$D_f = x \neq [0, 1)$ | نیست ✗

ج) $D_f = \emptyset$ | $D_f = (-\infty, 0)$ | نیست ✗

د) $\frac{x(x^2-1)}{x-1} = \frac{x(x-1)(x+1)}{x-1} = x^2 + x$ | هست ✓

③

$f(x) + g(x) = 2f(x) = 2x^2 + 2$
$f(x) = x^2 + 1$

$g(x) = x^2 + x + 1 - x^2 - 1$
$g(x) = x$

$(x^2+1)^2 - (x)^2 = x^4 + 1 + 2x^2 - x^2 = x^4 + x^2 + 1$

④

$f(x)$: $x^2 - 4 \geq 0$
$x^2 \geq 4$
$x \geq 2$
$x \leq -2$

$g(x)$:
$x \geq 2$
$x \leq -2$

$f \times g = (x - \sqrt{x^2-4})(x + \sqrt{x^2-4}) =$
$x^2 - (x^2 - 4) = x^2 - x^2 + 4 = 4$

$\begin{cases} 4 = (-\infty, -2] \cup [2, +\infty) \\ \cup = (-2, 2) \end{cases}$

$$D_g = D_f$$

$D_g = \quad 2x^2 - 2x - 3 \neq 0$

$\Delta = b^2 - 4ac = 9 - (-4 \times 3) = 49$

$x = \frac{-b \pm \sqrt{\Delta}}{2} = \frac{2 \pm \sqrt{49}}{2} = \begin{cases} \frac{2+7}{2} = \frac{3}{2} \\ \frac{2-7}{2} = -1 \end{cases}$ $\quad D_g = R - \{\frac{3}{2}, -1\}$

$(x - \frac{3}{2})(x+1) = x^2 - \frac{1}{2}x - \frac{3}{2} \rightarrow m = +\frac{1}{2}$

$n = -\frac{3}{2}$

$x = 0 \quad g = \frac{b}{3} \quad f = \frac{2}{\frac{-3}{2}} = \frac{4}{-3} \Rightarrow b = -4$

$x = 1 \rightarrow \frac{1+4}{1-2-3} = \frac{3}{-4}$

$\frac{a+2}{\cancel{2}} \quad 1 - \frac{1}{2} - \frac{3}{2} = +1 - 2 = -2$

$\frac{2a+4}{-4} = \left(\frac{a+2}{-2}\right)^{\times 2} = \frac{3}{-4}$

$2a + 4 = 3$

$2a = -1$

$a = \frac{-1}{2}$

$am - bn = \left(\frac{-1}{2} \times \frac{1}{2}\right) - \left(-4 \times \frac{3}{2}\right)$

$-\frac{1}{4}$

$-\frac{1}{4} + 10 = \boxed{9\frac{3}{4}}$

$\frac{2}{b} = \frac{b}{8} \rightarrow b^2 = 16$

$b = \pm 4$

$8x + b \neq 0$

$8x \neq -b$

$x \neq \frac{-b}{8} = a$

$g(0) = c$

$f(0) = \frac{2}{b} = c \quad bc = 2$

$\frac{bx+2}{8x+b} = c \rightarrow 8xc + bc = bx + 2$

$8xc = bx$

$8c = b \rightarrow c = \frac{b}{8}$

$\frac{ab}{c} = \frac{-\frac{b}{8} \times b}{\frac{b}{8}} = -b = \boxed{\pm 4}$

$2f = \{(-1, 6)(2, 8)(3, -4)(0, 1)\}$

$f = \{(-1, 2)(2, 6)(3, 4)(0, \frac{1}{2})\}$

$2g = \{(2, 8)(3, 12)(-1, -8)(5, 0)\}$

$g = \{(2, 4)(3, 6)(-1, -4)(5, 0)\}$

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

$R = \{4, 1, 3\}$

$a=-1$
$d=-1$

$3a-2b=1$
$-3-2b=1$
$-2b=4$
$b=-2$

$d+c=-1+3$
$=2$

$-1-(-4)=c$
$+4$
$c=3$

(8)

(9)

$(a,b)\to b=0$

$-x^2+x-m=0$

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

$\sqrt{-(x^2-x+m)}$

$\sqrt{-(x^2-x+\frac{1}{4})}=\sqrt{-(x-\frac{1}{2})^2}=0$

$x-\frac{1}{2}=0$
$x=\frac{1}{2}=0$

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

(10)

$D_g=D_f=R-\{c\}$

$g(1)=\frac{2}{1-4+3\times4}$

$f(1)=\frac{2+a}{1+4+b\times4}=\frac{2+a}{14}\to\left(\frac{2}{4}\right)^{\times4}=\frac{2+a}{14}$

$2+a=8$
$a=6$

$b=9 \to x^2+4x+9=(x+2)^2 \longrightarrow D=R-\{-2\}$

$4+9+(-2)=12$ $\quad c=-2$
10