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الف) $f(x) = \sqrt{x|x|}$, $g(x) = x$ $x|x| \geq 0$ $x \geq 0$

$D_f = [0, +\infty)$ $D_g = \mathbb{R}$ $D_{f \cdot g} = [0, +\infty)$

ب) $f(x) = (x+3)(x+1) + x + 4$, $g(x) = 1$

$D_f = \mathbb{R}$ $D_g = \mathbb{R}$ $D_{f \cdot g} = \mathbb{R}$

ج) $f(x) = x \sin x$, $g(x) = \sin x$

$D_f = \mathbb{R}$ $D_g = \mathbb{R}$ $D_{f \cdot g} = \mathbb{R}$

د) $f(x) = \frac{x}{|x|}$, $g(x) = \frac{1}{x}$

$D_f = \mathbb{R} \setminus \{0\}$ $D_g = \mathbb{R} \setminus \{0\}$ $D_{f \cdot g} = \mathbb{R} \setminus \{0\}$

ه) $f(x) = [x]$, $g(x) = x - [x]$

$D_f = \mathbb{R}$ $D_g = \mathbb{R}$ $D_{f \cdot g} = \mathbb{R}$

و) $f(x) = \frac{1}{[x]}$, $g(x) = \frac{1}{x}$

$D_f = \mathbb{R} \setminus \{0\}$ $D_g = \mathbb{R} \setminus \{0\}$ $D_{f \cdot g} = \mathbb{R} \setminus \{0\}$

ز) $f(x) = \sqrt{x-x^2}$, $g(x) = \sqrt{x}$

$D_f = [0, 1]$ $D_g = [0, +\infty)$ $D_{f \cdot g} = [0, 1]$

ح) $f(x) = x^2 - x + 1$, $g(x) = x^2 + x + 1$

$D_f = \mathbb{R}$ $D_g = \mathbb{R}$ $D_{f \cdot g} = \mathbb{R}$

ط) $f(x) = x^2 + 1$, $g(x) = x$

$D_f = \mathbb{R}$ $D_g = \mathbb{R}$ $D_{f \cdot g} = \mathbb{R}$

ث) $f(x) = x^2 - mx + n$, $g(x) = x^2 - nx + m$

$D_f = \mathbb{R}$ $D_g = \mathbb{R}$ $D_{f \cdot g} = \mathbb{R}$

ج) $f(x) = \frac{x-b}{x^2-x-a}$, $g(x) = \frac{x-b}{x^2-x-a}$

$D_f = \mathbb{R} \setminus \{a\}$ $D_g = \mathbb{R} \setminus \{a\}$ $D_{f \cdot g} = \mathbb{R} \setminus \{a\}$

د) $f(x) = \frac{x-b}{x^2-x-a}$, $g(x) = \frac{x-b}{x^2-x-a}$

$D_f = \mathbb{R} \setminus \{a\}$ $D_g = \mathbb{R} \setminus \{a\}$ $D_{f \cdot g} = \mathbb{R} \setminus \{a\}$

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$$f(x) = \frac{bx+r}{ax+b} \quad g(x) = c \quad Dg = R - \{d\}$$

$$\frac{ab}{c} = \pm f$$

$$ax+b \neq 0 \Rightarrow d = - \Rightarrow \frac{db}{c} = 0$$

$$b = \pm f \quad a = \pm \frac{1}{f}$$

$$\frac{bx+r}{ax+b} = c \rightarrow bx+r = acx+bc \rightarrow \begin{cases} b=ac \\ bc=r \end{cases} \rightarrow c = \pm \frac{1}{f}$$

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

$$g = \{(2, 4), (3, 9), (-1, -4), (0, 0)\} \quad f = \{(-1, 2), (2, 4), (3, -2), (0, \frac{1}{2})\}$$

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

$$d = d = -1 \quad d - 2b = 1 - r$$

$$c = d - 3b \quad \frac{d}{-1} = \frac{1}{-2}$$

$$d + c = -1 + 0 = -1$$

$$f = \{(2, d), (-3, 3d+2b), (c, d), (2, d)\}$$

$$g = \{(2, -1), (-3, 1), (d-3b, 0)\}$$

چون دامنه گ-ف عکس است بنابر این دامنه f باید یک عکس باشد.

$$\Delta = 0 \rightarrow 1 - fm = 0 \rightarrow fm = 1 \rightarrow m = \frac{1}{f}$$

$$f(x) = \sqrt{-(x - \frac{1}{f})^2} \rightarrow a = \frac{1}{f} \quad b = 0$$

$$a + b = \frac{1}{f}$$

$$f(x) = \frac{rx+d}{x^2+4x+b}, \quad g(x) = \frac{1}{x-c} \quad x-c \neq 0$$

$$= (x-c)^2 \left(\frac{rx+d}{x^2+4x+b} \right) = \frac{1}{x-c}$$

$$x^2+4x+b = (x-c)^2$$

$$\frac{rx+d}{x^2+4x+b} = x-c \quad b=4 \Rightarrow c=3$$

$$\Rightarrow rx+d = x^2+4x-3 \quad b=9$$

$$d+b+c = 9+4-3 = 10$$