

باستفاده از تعریف شماره ۱ کلاس دهم سبک A

الف) $f(x) = \sqrt{x|x|}$ $D_f = [0, +\infty)$ دامنه های نابرابر مساوی هستند
 $g(x) = x$ $D_g = \mathbb{R}$

ب) $f(x) = \frac{(x+1)(x+1)x+1}{x^2+5x+7} = \frac{x^3+2x^2+x+1}{x^2+5x+7}$ $D_f = \mathbb{R}$ دامنه برابر و ضابطه برابر
 $g(x) = 1$ $D_g = \mathbb{R}$ مساوی هستند

ج) $f(x) = \frac{2\sin x - 3}{2\sin x - 3} = \frac{2\sin x(2\sin x - 3)}{2\sin x - 3}$ $D_f = \mathbb{R}$ دامنه برابر و ضابطه برابر
 $g(x) = 1$ $D_g = \mathbb{R}$ مساوی اند

د) $f(x) = \frac{x}{|x|}$ $D_f = \mathbb{R} - \{0\}$ دامنه، ضابطه و شکل برابر
 $g(x) = \frac{|x|}{x}$ $D_g = \mathbb{R} - \{0\}$ مساوی اند

الف) $g(x) = [x - [x]]$ $D_g = \mathbb{R}$ دامنه و ضابطه برابر
 $D_g = \mathbb{R}$ مساوی اند

ب) $f(x) = \frac{1}{[x]}$ $D_f = \mathbb{R} - [0, \frac{1}{2})$ دامنه های نابرابر
 $g(x) = \frac{1}{x}$ $D_g = \mathbb{R} - [0, 1)$ مساوی اند

ج) $f(x) = \frac{1}{\sqrt{x-|x|}}$ $D_f = \emptyset$ دامنه نابرابر
 $g(x) = \frac{1}{\sqrt{|x|-x}}$ $D_g = \mathbb{R}^+$ مساوی اند

د) $f(x) = \begin{cases} \frac{x-1}{x-1} & x \neq 1 \\ 2 & x = 1 \end{cases}$ $D_f = \mathbb{R}$ دامنه برابر و ضابطه برابر
 $g(x) = \frac{x-1}{x-1}$ $D_g = \mathbb{R}$ مساوی اند

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

$$f(x) = x - \sqrt{x^2 - r^2} \quad \begin{matrix} x^2 - r^2 \geq 0 \\ x^2 \geq r^2 \\ x \geq r \\ x \leq -r \end{matrix} \quad (f \times g) = (x - \sqrt{x^2 - r^2})(x + \sqrt{x^2 - r^2})$$

$$g(x) = x + \sqrt{x^2 - r^2} \quad = x^2 - (\sqrt{x^2 - r^2})^2 = x^2 - x^2 + r^2 = r^2$$

$f \times g$:

$$g(x) = \frac{x - b}{x^2 - r^2} \times \frac{1}{f} = \frac{\frac{x}{r} - \frac{b}{r}}{x^2 - r^2} = \frac{ax + r}{x^2 - r^2} = f(x) \quad \begin{cases} a = \frac{1}{r} \\ b = -\frac{r^2}{r} \\ m = -\frac{2r}{r} \\ n = -\frac{r^2}{r} \end{cases}$$

$(rx - r^2)(x + 1)$ $D_g = \mathbb{R} - \left\{\frac{r^2}{r}, -1\right\}$

$$am - bn = \left(\frac{1}{r} \times \frac{r^2}{r}\right) - \left(-r^2 \times \frac{1}{r}\right) = \frac{r^2}{r} - 1 = r - 1 = -9, r^2$$

$$D_g = D_f \Rightarrow D_f = \mathbb{R} - \{a\} \quad f(x) = \frac{bx + r}{x^2 + b} \quad \begin{cases} \Delta x \neq -b \\ x = -\frac{b}{\Delta} \end{cases} \quad \begin{cases} a = -\frac{b}{\Delta} \end{cases}$$

$g(x) = \frac{1}{f(x)}$ $b = r^2 \rightarrow c = \frac{r^2 x + r}{x^2 + r^2} = \frac{1}{f}$ $b = -r^2 \rightarrow c = \frac{-r^2 x + r}{x^2 - r^2} = -\frac{1}{f} \quad a = \frac{1}{r}$

$\frac{ab}{c} = \frac{-\frac{1}{r} \times r^2}{\frac{1}{r}} = -r^2$ $\frac{ab}{c} = \frac{\frac{1}{r} \times -r^2}{-\frac{1}{r}} = r^2$

$$rf - 1 = k \rightarrow f = \left\{(-1, r), (r, r), (r, -r), \left(0, \frac{1}{r}\right)\right\}$$

$$f = \frac{k+1}{r}$$

$\frac{rg}{f+g} = \left\{(-1, \frac{r(-r)}{r-r}), (r, \frac{r(r)}{r+r}), (r, \frac{r(r)}{-r+r})\right\}$ $R_{\frac{rg}{f+g}} = \{1, r, r\}$

$$f = \{(r, a), (-r, ra + b), (c, a), (r, d)\} \quad g = \{(r, -1), (a - rb, a), (r, 1)\}$$

$a = d = -1$ $ra - rb = 1$ $-r - rb = 1$ $b = -r$ $c = a - rb = -1 - r(-r) = -1 + r^2$ $c + d = a - 1 = r^2$

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

$D_g = D_f = a$ $b^2 - 4ac = 0$ $1^2 - 4(-1)(-m) = 0$ $1 - 4m = 0$ $m = \frac{1}{4} \rightarrow f(x) = \sqrt{-x^2 + x - \frac{1}{4}}$

$\text{Max} \left| \frac{-1}{4(-1)} \right| = \frac{1}{4}$ $a = \frac{1}{4}$ $b = 0$ $a + b = \frac{1}{4} \rightarrow \text{مطلوب}$

$$Dg = Df = \mathbb{R} - \{c\}$$

چون یک عدد است پس ریشه پنج تابع f باید مضاعف باشد

$$f(x) = \frac{rx + a}{(x^2 + 9x + b)^2} = \frac{rx + a}{(x + 3)^2}$$

$$\Delta = 0 \Rightarrow c^2 - r^2(1 \times b) = 0$$

$$rb = r^2 \Rightarrow \boxed{b = 9}$$

$$\frac{rx + a}{(x + 3)^2} = \frac{r(x + \frac{a}{r})}{(x + 3)(x + 3)} = \frac{r}{x + 3} = g(x)$$

$$\left\{ \begin{array}{l} a + b + c = 9 + 9 + (-3) = 12 \\ \text{✓} \end{array} \right.$$

$$x - c = x + 3 \Rightarrow \boxed{c = -3}$$

$$\left\{ \begin{array}{l} x + \frac{a}{r} = x + 3 \\ \boxed{a = 9} \end{array} \right.$$