

① $\sqrt{x+1} \sqrt{x-2} \rightarrow x+2\sqrt{x-2}-2 \rightarrow (x-2)+2\sqrt{x-2}+2 = (\sqrt{x-2}+2)^2$
 $f(x) = \sqrt{(\sqrt{x-2}+2)^2} \rightarrow |\sqrt{x-2}+2| \sqrt{x-2}+2$ $x \geq 2$

② $x-2\sqrt{x-2}, (x-2)-2\sqrt{x-2}+2 \rightarrow (\sqrt{x-2}-2)^2 \rightarrow |\sqrt{x-2}-2|$ $x \geq 2$
 $g(x) = \sqrt{x-2}-2$
 $f(x) = g(x), (\sqrt{x-2}-2)(\sqrt{x-2}-2) = 2\sqrt{x-2} = a+2$
 $a=0, b=2, c=-2$ ② ①

$f(x) = \frac{x+2}{x^2-2x+3} \rightarrow D_f = x^2-2x+3 \neq 0$ $D_f \cap \mathbb{R} = \{1, 3\}$
 $(x-3)(x-1) \rightarrow x \neq 1, 3$

$\frac{g}{f} = \left\{ (0, 4), \left(\frac{1}{2}, -\frac{1}{2} \right) \right\}$ دایره های مستقر
 $f(0) = \frac{0+2}{0^2-2 \cdot 0+3} = \frac{2}{3}, g(0) = 4 \rightarrow \frac{4}{3}, \left(\frac{1}{2}, -\frac{1}{2} \right)$ ② ①

الف) $f(x) = \left\{ \left(\frac{1}{2}, 2 \right), (1, 0), (2, 2), \left(\frac{1}{2}, 4 \right) \right\}$

ب) $f(x) = \left\{ (1, 2), (\sqrt{3}, -1), (2, 2), (-1, 2), (-\sqrt{3}, -1), (-2, 2) \right\}$

ج) $g(x) = 1 = \left\{ (-2, 1), (1, 3), (3, 4), (-1, 1) \right\}$ $g(x) = 0 \rightarrow (-1, 0)$

د) $\frac{f}{g} = \left\{ (1, -2), (3, -1) \right\}$ $D_f \cap D_g = \left\{ \left(\frac{1}{2}, 2 \right) \right\}$

$D_f \cap D_g = \{2, -2, 3\}$ $f(2, 1)$
 $2f+g = \left\{ (2, 5), (-2, 4), (3, 5) \right\}$ $g(2, 5)$

$f(x) = \sqrt{\sqrt{x}-x} \xrightarrow{D_f} \sqrt{x}-x \geq 0 \rightarrow \sqrt{x} \geq x \rightarrow x \leq 1$ $x \geq 0 \rightarrow x \geq 0$

$g(x) = [x] + [-x], \{x \in \mathbb{Z} \rightarrow -1\}$ $x \neq 2$

$g(x) + 1 \neq 0 \rightarrow g(x) \neq -1 \rightarrow x \in \mathbb{Z}$ ② ①

$f(x) = \sqrt{5x - x^2 - 4} \rightarrow [1, 4], D_f$ $D_g = \{1, 2, 4, 5\} \xrightarrow{\cap} \{1, 2, 4\}$ ✓ صفر و غیر صفر $\frac{f(x)}{g(x)} = \left\{ (1, 0), \left(2, \frac{\sqrt{2}}{2}\right), (4, 0) \right\} \quad \text{D}$	$D_f = \{x \mid 5x - x^2 - 4 \geq 0\} \rightarrow x^2 - 5x + 4 \leq 0 \quad x \in [1, 4]$ $(x-1)(x-4) \leq 0 \rightarrow \begin{array}{c c c} + & - & + \\ \hline 1 & & 4 \end{array}$
رابطه ۲، چند جمله‌ای درجه ۲، $R_y, \mathbb{R}$ (الف) باید برود! با روش اصلی بدست آوری! ✓ $y \mapsto \frac{1}{x^2 - 2x} \rightarrow x^2 y - 2xy - 1$ $x^2 y - 2xy - 1 = 0$ $\Delta \geq 0 \quad (-2y)^2 - 4y(-1) = 4y^2 + 4y \geq 0$ $4y(y+1) \geq 0 \quad y \in (-\infty, -1] \cup (0, +\infty)$	صست یک است مخرج صفر نشود $y \neq 0 \quad x = 0$ ✓ $y \neq 0$ صست یک است $y(y+1) \geq 0 \quad y \in (-\infty, -1] \cup (0, +\infty)$
الف) $x^2 - 2x + 1 = 0 \rightarrow [1, +\infty)$ $x = \frac{b}{2a} = \frac{2}{2} = 1 \quad y_1 = 1, y_2 = 1$ ب) $y_1 = x^2 + 4x + 3 \rightarrow (-\infty, 12]$ $x_1 = \frac{b}{2a} = \frac{-4}{2} = -2 \quad y_1 = 12, y_2 = 12$ ج) $y_1 = \sqrt{x^2 - 4x - 5} \rightarrow \sqrt{(-\infty, +\infty)}$ $x_1 = \frac{b}{2a} = \frac{2}{2} = 1 \quad y_1 = -1, y_2 = -1$	د) $\sqrt{4x - x^2} \rightarrow (-\infty, 4] \rightarrow [0, 3]$ $x_1 = \frac{b}{2a} = \frac{2}{2} = 1 \quad y_1 = 3, y_2 = 3$
الف) $y, \mathbb{R}$ ب) $\mathbb{R}$ ✓ ج) $\sqrt{\mathbb{R}} \rightarrow [0, +\infty)$ د) $(\mathbb{R})^+ \rightarrow (0, +\infty)$	۹
الف) $y = \frac{x+1}{x-2} \quad \mathbb{R} \setminus \{2\}$ ب) $y = \frac{x+1}{x-2} \quad \mathbb{R} \setminus \{2\}$	۱۰

الف) $y = n^3 - 2n^2 + 2n - 1 + 1 = y = (n-1)^3 + 1$ (✓)

$$y-1 = (n-1)^3 \rightarrow \sqrt[3]{y-1} = n-1 \rightarrow n = \sqrt[3]{y-1} + 1$$

$R_f = \mathbb{R}$

ب) $y = \frac{1}{n^2 - 2n} \rightarrow n^2 y - 2ny = 1 \rightarrow n^2 y - 2ny - 1 = 0$

$y \neq 0 \rightarrow n = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y} \rightarrow 4y(y+1) \geq 0 \rightarrow \frac{-1}{+} \frac{0}{+}$

$y = 0 \rightarrow 0 = 1 \times$ صحتی وجود ندارد! $\rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$