

$g(x) = \sqrt{x-4} \sqrt{x-4}$ $f(x) = \sqrt{x-4} \sqrt{x-4}$ $\sqrt{x-4} = t$
 $x > 4 \rightarrow \sqrt{x-4} > 0 \rightarrow \sqrt{x-4} \geq (t)^2 \rightarrow t^2 = x-4 \rightarrow x = t^2+4$ $\frac{a+b}{c} = \frac{0+2}{-4} = -\frac{1}{2}$
 $g(x) = \frac{\sqrt{t^2+4-4} \sqrt{t^2+4-4}}{(t-2)^2} \Rightarrow \frac{|t-2|}{(t-2)^2} \Rightarrow \frac{1}{|t-2|} \Rightarrow \frac{1}{t-2} \Rightarrow \sqrt{x-4} = t$
 $f(x) = \frac{\sqrt{t^2+4-4} \sqrt{t^2+4-4}}{(t-2)^2} \Rightarrow \frac{|t-2|}{(t-2)^2} \Rightarrow \frac{1}{|t-2|} \Rightarrow \frac{1}{t-2} \Rightarrow \sqrt{x-4} = t$
 $\begin{cases} f(x) + g(x) = a + b \sqrt{x+c} \\ \sqrt{x-4} + \frac{1}{\sqrt{x-4}} = a + b \sqrt{x+c} \end{cases}$
 $\begin{cases} a=0 \\ b=1 \\ c=-4 \end{cases}$

$g(x) = \{(2,1)(1,0)(3,0)(0,4)\}$ $f(x) = \frac{x+2}{x^2-4x+2}$
 $\Rightarrow f(x) = \{(2,-4)(1,\frac{1}{2})(3,\frac{1}{2})(0,\frac{1}{2})\} \Rightarrow f(x) = \{(2,-4)(1,\frac{1}{2})(3,\frac{1}{2})(0,\frac{1}{2})\}$
 $\frac{g}{f} \Rightarrow \{(2,\frac{1}{4})(0,\frac{1}{4})\} \Rightarrow \{(2,-\frac{1}{4})(0,4)\}$

$g(x) = \{(-2,2)(1,-1)(2,2)(-1,0)\}$ $f(x) = \{(1,2)(2,-1)(3,2)(-1,4)\}$
 $\Rightarrow f(x) \Rightarrow x=1 \rightarrow x=\frac{1}{x} \Rightarrow x=2 \rightarrow x=\frac{1}{x} \Rightarrow x=3 \rightarrow x=\frac{1}{x} \Rightarrow x=-1 \rightarrow x=-\frac{1}{x} \Rightarrow$
 $f(x) = \{(1,2)(2,-1)(3,2)(-1,4)\}$
 $\Rightarrow f(x) \Rightarrow x^2=1 \rightarrow x=\pm 1 \Rightarrow x^2=2 \rightarrow x=\pm \sqrt{2} \Rightarrow x^2=3 \rightarrow x=\pm \sqrt{3} \Rightarrow x^2=-1 \rightarrow x=\pm i$
 $f(x) = \{(1,2)(2,-1)(3,2)(-1,4)\}$
 $\Rightarrow f(x) \Rightarrow \{(1,2)(2,-1)(3,2)(-1,4)\}$
 $\Rightarrow f(x) \Rightarrow \{(1,2)(2,-1)(3,2)(-1,4)\}$

$g = \{(0,1)(2,2)(-1,4)(-1,2)(2,5)\}$ $f(x) = \{(2,1)(2,1)(4,9)(-1,0)\}$
 $h = 2f + g \Rightarrow \{(2,2)(1,2)(2,2)(-2,4)(2,9)\} \Rightarrow h = \{(2,2)(1,2)(-2,4)\}$

$g(x) = [x] + [-x]$ $f(x) = \frac{\sqrt{x^2-1}}{x-1}$
 $\begin{cases} x \in \mathbb{Z} \rightarrow g=0 \\ x \notin \mathbb{Z} \rightarrow g=-10x \Rightarrow D_g = \mathbb{Z} \setminus \mathbb{N} \end{cases}$
 $\left\{ \frac{f}{g+1} \right\}(x)$
 $g+1 \neq 0 \rightarrow g \neq -1$ $D_g = \{0, 1, 2\}$
 $x > 1 \Rightarrow \sqrt{x^2-1} \geq 0 \Rightarrow (\sqrt{x^2-1}) \geq (x-1)$
 $x^2-1 \leq (x-1)^2$
 $x(x-1) \leq 0$
 $x=0 \quad x=1$
 $D_f = [0, 1, 2] \cap \mathbb{N}$

$$f(x) = \frac{\Delta x - x^r - \frac{1}{2}(\Delta x - x^r)^2}{x - \frac{1}{2}(\Delta x - x^r)} \quad \left(\frac{x - \frac{1}{2}(\Delta x - x^r)}{x - \frac{1}{2}(\Delta x - x^r)} \right) \left(\frac{x - \frac{1}{2}(\Delta x - x^r)}{x - \frac{1}{2}(\Delta x - x^r)} \right)$$

$$f(x) = [(\underline{1,0})(\underline{2,\sqrt{1}})(\underline{3,\sqrt{1}})(\underline{4,0})]$$

$$h(x) = \frac{f(x)}{g(x)} \Rightarrow ((1, 0)(r, \frac{\sqrt{r}}{r})(r, 0))$$

$$y = x^2 - 3x^2 + 3x \Rightarrow \text{تقریباً ثابت} \Rightarrow (x-1)^2 = y-1 \Rightarrow (x-1) = \sqrt{y-1} = R_F = R$$

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$$\text{ب) } y = \frac{1}{x^2 - 2x} = \frac{y x^2 - 2y x}{y x^2 - 2y x - 1} = 1 \Rightarrow \Delta = \sqrt{f_y - f(y)(-1)} \Rightarrow f_y + f_y \geq 0 \rightarrow f_y(y+1) = 0$$

$\boxed{y=0} \quad \boxed{y=-1}$

$$\Rightarrow 0 = \frac{1}{\alpha r - r_0} \Rightarrow 1 = 0$$

$$R_f = (-\infty, -1] \cup (0, +\infty) \quad \begin{array}{c} -1 \quad 0 \\ + \quad | \quad - \quad | \quad + \end{array}$$

الف) $x^2 - 4x + 1$ — $S \mid \pi_S = \frac{b}{ra} = \frac{f}{y} = 2 \Rightarrow R(f) = [y_0, \infty)$
 u $\frac{b}{ra}$ $y_S = f - 1 + 1 \Rightarrow y$

ب) $-x^2 + 9x + 12$ $\hookrightarrow$ $\begin{cases} x_5 = \frac{-b}{2a} = \frac{-9}{-2} = 4.5 \\ y_5 = -9 + 11 + 12 = 14 \end{cases} \Rightarrow R(f) = (-\infty, 14]$

c) $\lim_{x \rightarrow \infty} \sqrt{x^2 - 1} - x = \frac{b}{a} \cdot \frac{f}{g} = \frac{1}{1} = 1 \Rightarrow R(f) \sqrt{-1, \infty} \Rightarrow [-1, \infty)$

$$1) \sqrt{4x - x^2} \quad \begin{matrix} \text{S} \\ \text{I} \end{matrix} \begin{matrix} x_5 = \frac{b}{2a} = \frac{-4}{-2} = 2 \\ y_5 = 11 - 4 = 7 \end{matrix} \Rightarrow R_f = \sqrt{(-\infty, 4]} \Rightarrow R_f = [0, 2]$$

الف) $y = x^r - \Delta x^r + rx + 1 \rightarrow$ تفاضل $\Rightarrow R_{(f)} = \mathbb{R}$

ب) $y = x^v - 9x^k + 12x + 1$ تجزیه در مخرج $\Rightarrow R_{(f)} = 'R$

ج.) $\sqrt{x^2 - 4x + 4} = \sqrt{(x-2)^2} = |x-2|$ ————— زیرین توانمند

$$c) (x^0 - f_{x^r} + (x+1)^r) \xrightarrow{\text{برابر کردن توان ها}} \frac{R}{(r \text{ به توان})} \rightarrow [0, \infty)$$

$$\text{الف) } y = \frac{x+1}{x-2} \Rightarrow R_{(f)} = \mathbb{R} - \left\{ \frac{1}{2} \right\} \Rightarrow R_{(f)} = \mathbb{R} - \left\{ \frac{1}{2} \right\} \rightarrow \mathbb{R} - \left\{ \frac{1}{2} \right\}$$

$$\Rightarrow y = \frac{x+1}{x+1} \Rightarrow R(f) = \{R - \{1\}\}$$