

$f(x) + g(x) = a + b\sqrt{x+c}$ $f(x) + g(x) =$
 $\frac{a+b}{c} = ?$ $\sqrt{x+c}\sqrt{x+c} + \sqrt{x+c}\sqrt{x+c} = A\sqrt{x}$
 $* \sqrt{(x+c)\sqrt{x+c}}(x-c\sqrt{x+c}) =$ $x + c\sqrt{x+c} + x - c\sqrt{x+c} + \sqrt{x+c}\sqrt{x+c} = A^2$
 $\sqrt{x^2 - 14cx + c^2} = \sqrt{x^2 + 4x - 14x} =$ $A = \sqrt{4x - 14} = \sqrt{4(x-3.5)} = 2\sqrt{x-3.5}$
 $\sqrt{(x-1)^2} = |x-1| \xrightarrow{x \geq 1} x-1$ $\begin{cases} a=0 \\ b=4 \\ c=-14 \end{cases}$ $\frac{a+b}{c} = \frac{4}{-14} = -\frac{2}{7}$

$f(x) = \frac{x+2}{x^2 - 4x + 3}$ $g(x) = \{(2,1), (1,0), (3,5), (0,7)\}$
 $\frac{g}{f} = ?$ $\frac{g}{f} = \{(2, \frac{1}{f(2)}), (0, \frac{7}{f(0)})\} = \{(2, \frac{1}{-1}), (0, \frac{7}{3})\}$
 $x=2 \rightarrow f(x) = \frac{2}{2-8+3} = \frac{2}{-3} = -\frac{2}{3}$
 $x=0 \rightarrow f(x) = \frac{2}{0-0+3} = \frac{2}{3}$

$f(x) = \{(1,2), (3,-1), (4,2), (-1,4)\}$ $g(x) = \{(-2,2), (1,-1), (2,2), (-1,0)\}$
 $f \circ g = \{(1,2), (3,-1), (4,2), (-1,4)\}$ $x=1 \rightarrow x = \frac{1}{p}$
 $f \circ f(x) = \{(1,2), (-1,2), (2,2), (-1,4)\}$ $x^2=1 \rightarrow x = \pm 1$
 $d - \frac{y}{g} = \{(1, \frac{y}{-1}), (3, \frac{y}{-1}), (-1, \frac{y}{0})\} =$ $\{(-1, -y), (3, -y)\}$

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

$f(x) = \frac{\sqrt{3x-x}}{x-1}$ $g(x) = [x] + [-x]$
 $(\frac{f}{g+1})(x) = \frac{\sqrt{3x-x}}{[x] + [-x] + 1}$ $[x] + [-x] + 1 \neq 0$
 $[x] + [-x] \neq -1$
 $I) x \in \mathbb{Z}$ $II) x-1 \neq 0 \rightarrow x \neq 1$
 $III) x \in [0, 1]$

$$f(x) = \sqrt{5x - x^2 - 4} \quad g(x) = \{(1, 4), (4, 4), (4, 5), (5, 1)\}$$

$$h(x) = \frac{f(x)}{g(x)}$$

$$5x - x^2 - 4 \geq 0$$

$$x^2 - 5x + 4 \leq 0$$

$$(x-1)(x-4) \leq 0$$

$$\begin{array}{c} + \quad - \quad + \\ \hline 1 \quad 4 \end{array} \quad D_f: [1, 4]$$

$$\lim_{x \rightarrow 1} g(x) \rightarrow 1 - 4 - 4$$

$$x=1 \rightarrow f(x) = \sqrt{5-1-4} = 0$$

$$x=4 \rightarrow f(x) = \sqrt{20-16-4} = \sqrt{0}$$

$$x=4 \rightarrow f(x) = \sqrt{20-16-4} = 0$$

$$h(x) = \{(1, \frac{0}{4}), (4, \frac{\sqrt{0}}{4}), (4, \frac{0}{4})\}$$

$$h(x) = \{(1, 0), (4, \frac{\sqrt{0}}{4}), (4, 0)\}$$

$$\text{الف} - y = x^2 - 4x^2 + 4x - 1 + 1$$

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

$$y-1 = (x-1)^2$$

$$\sqrt{y-1} = x-1$$

$$\rightarrow x = \sqrt{y-1} + 1$$

$$R_f = \mathbb{R}$$

$$\text{ب} - y = \frac{1}{x^2 - 4x}$$

$$yx^2 - 4yx = 1$$

$$yx^2 - 4yx - 1 = 0 \quad \begin{cases} a=y \\ b=-4y \\ c=-1 \end{cases}$$

$$\Delta = b^2 - 4ac = 16y^2 + 4y$$

$$x = \frac{4y \pm \sqrt{16y^2 + 4y}}{2y}$$

$$4y^2 + 4y \geq 0 \quad y(y+1) \geq 0$$

$$y^2 + y \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$y(y+1) \geq 0$$

$$\text{الف} - y = x^2 - 4x + 10$$

$$a > 0 \rightarrow \text{Min} \quad \frac{4}{4} = 1$$

$$x - 4 + 10 = 6$$

$$R_f: [4, +\infty)$$

$$\text{ب} - y = -x^2 + 4x + 4$$

$$a < 0 \rightarrow \text{Max} \quad \frac{4}{4} = 1$$

$$-a + 4 + 4 = 8$$

$$R_f: (-\infty, 4]$$

$$\text{ج} - y = \sqrt{x^2 - 4x - 4}$$

$$a > 0 \rightarrow \text{Min} \quad \frac{4}{4} = 1$$

$$x - 4 - 4 = -4$$

$$R_f: [-4, +\infty) = [0, +\infty)$$

$$\text{د} - y = \sqrt{4x - x^2} = \sqrt{-x^2 + 4x}$$

$$a < 0 \rightarrow \text{Max} \quad \frac{4}{4} = 1$$

$$-a + 4 = 4$$

$$R_f: [-4, 4] = [0, 4]$$

$$\text{الف} - y = x^2 - 5x^2 + 4x + 1$$

$$R_f = \mathbb{R}$$

$$\text{ب} - y = x^2 - 4x^2 + 4x + 4$$

$$R_f = \mathbb{R}$$

$$\text{ج} - y = \sqrt{x^2 - 4x^2 + 5x + 1}$$

$$R_f: \mathbb{R} = [0, +\infty)$$

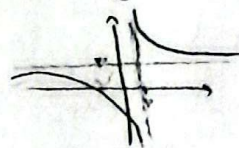
$$\text{د} - y = (x^2 - 4x^2 + 4x + 1)^2$$

$$R_f: (\mathbb{R})^2 = [0, +\infty)$$

$$\text{الف} - y = \frac{4x+1}{x-4}$$

$$x=4 \rightarrow \text{مجاوب قائم}$$

$$\frac{17}{-3} = -\frac{17}{3}$$



$$R_f: \mathbb{R} - \{4\}$$

$$\text{ب} - y = \frac{4x+1}{x+1}$$

$$x=-1 \rightarrow \text{مجاوب قائم}$$

$$\frac{5}{0} = \text{مجاوب افقی}$$



$$R_f: \mathbb{R} - \{-1\}$$



مجاوب قائم و افقی را از جواب حذف می کنیم

* می‌دانیم دقت‌های داخل پدافند روی درایه اول و دقت‌های خارج پدافند روی درایه‌های دوم اتفاق می‌افتد.

$$x = -2 \rightarrow 2(3)^2 + 1 = 19 \quad \text{ج}$$

$$x = 1 \rightarrow 2(-1)^2 + 1 = 3$$

$$x = 3 \rightarrow 2(2)^2 + 1 = 9$$

$$x = -1 \rightarrow 2(0)^2 + 1 = 1$$

$$\rightarrow \{(-2, 19), (1, 3), (3, 9), (-1, 1)\}$$