

$$f(x) = \sqrt{x+4} \sqrt{x-4} \quad g(x) = \sqrt{x-4} \sqrt{x-4} \quad \begin{matrix} a=0 \\ b=2 \\ c=-4 \end{matrix} \quad \frac{a+b}{c} = \frac{2}{-4} = -\frac{1}{2}$$

$$f(x) + g(x) = A$$

$$A^2 = f^2(x) + g^2(x) + 2fg(x) = x+4 + x-4 + 2\sqrt{x^2-16}(x-4) = 2x + 2(x-4) = 4x-8$$

$$A = \sqrt{4x-8} = 2\sqrt{x-2} = a+b\sqrt{x+c} \quad x^2 - 16x + 64 = (x-4)^2$$

1

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

$$f(2) = -\frac{1}{2}$$

$$f(1) = 0$$

$$f(3) = 0$$

$$f(0) = \frac{2}{3}$$

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

2

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

$$a) f(2x) = \{(\frac{1}{2}, 2)(\frac{3}{2}, -1)(2, 2)(-\frac{1}{2}, 4)\}$$

$$b) f(x^2) = \{(1, 2)(-1, 2)(5, -1)(-5, -1)(2, 2)(-2, 2)\}$$

$$c) 2f'(x) + 1 = \{(-2, 19)(1, 3)(3, 9)(-1, 1)\} \quad \frac{2f}{g} = \{(1, -4)(3, -1)\}$$

3

$$f(x) = \{(2, 1)(3, 1)(4, 9)(-2, 0)\} \quad g(x) = \{(0, 1)(2, 3)(-2, 6)(-1, 2)(3, 3)\}$$

$$h = 2f + g = \{(2, 0)(3, 0)(-2, 6)\}$$

4

$$f(x) = \frac{\sqrt{3x-x}}{x-2} \quad g(x) = [x] + [-x] \quad \begin{matrix} x \in \mathbb{Z} \Rightarrow 0 \\ x \notin \mathbb{Z} \Rightarrow -1 \end{matrix} \quad * \text{خرج 0}$$

$$\left(\frac{f}{g+1}\right)(x) = f(x)$$

$$D_f = \{0, 1, 3\}$$

$$x \geq 0 \quad \sqrt{3x-x} \geq 0 \Rightarrow \sqrt{3x} \geq x$$

$$x \neq 2 \quad 3x \geq x^2 \Rightarrow x^2 - 3x \leq 0 \quad \frac{0}{+1} - \frac{3}{0} +$$

5

$$f(x) = \sqrt{ax - x^2 - 4} \quad g(x) = \{(1, 2), (2, 1), (4, 6), (6, 1)\}$$

$$h(x) = \frac{f(x)}{g(x)} = \{(1, 0), (2, \frac{\sqrt{2}}{2}), (4, 0)\}$$

$$-(x^2 - 6x + 4) = -(x-1)(x-5) \geq 0$$

$$\frac{1}{-1} + \frac{4}{1} =$$

$$\text{ا) } y = x^2 - 3x^2 + 3x \rightarrow y-1 = (x-1)^2$$

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

$$R_f = \mathbb{R}$$

$$\text{ب) } y = \frac{1}{x^2 + x} \quad yx^2 + yx = 1$$

$$yx^2 + yx - 1 = 0$$

$$\Delta \geq 0 \Rightarrow 4y^2 + 4y < 0$$

$$\frac{1}{1} - \frac{0}{1} = 1 \quad R_f = \mathbb{R} - (-1, 0)$$

$$\text{ا) } y = x^2 - 5x + 1$$

$$-\frac{14-5}{4} = 9 \rightarrow R_f = [9, +\infty)$$

$$\text{ب) } -x^2 + 4x + 3 = y$$

$$-\frac{34+12}{-4} = 12 \quad R_f = (-\infty, 12]$$

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

$$-\frac{14+12}{4} = -7 \rightarrow R_f = [0, +\infty)$$

$$\text{د) } y = \sqrt{9x - x^2}$$

$$-\frac{84}{-4} = 9 \quad R_f = [0, 3]$$

$$\text{ا) } y = x^2 - 6x^2 + 2x + 1$$

$$R_f = \mathbb{R}$$

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

$$R_f = \mathbb{R}$$

$$\text{ج) } y = \sqrt{x^2 - 9x^2 + 6x + 1}$$

$$R_f = [0, +\infty)$$

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

$$R_f = [0, +\infty)$$

$$\text{ا) } y = \frac{2x+1}{x-2}$$

$$R_f = \mathbb{R} - \{2\}$$

$$\text{ب) } y = \frac{2x+1}{x+1}$$

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