

(V)

آید و بعد از آن

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$$f(x) = \sqrt{x^2 + 4x + 4} = \sqrt{(x+2)^2} = x+2 \quad x \geq -2 \rightarrow t \geq 2$$

$$g(x) = \sqrt{x^2 - 4x + 4} = \sqrt{(x-2)^2} = x-2$$

$$f(x) + g(x) = 2x = 2\sqrt{x-2} = a + b\sqrt{x+c}$$

$\underbrace{0}_a \quad \underbrace{2}_b \quad \underbrace{-2}_c$

$$a=0 \quad b=2 \quad c=-2$$

$$\frac{a+b}{c} = \frac{2}{-2} = -1$$

$$f(x) = \frac{x+2}{x^2-4x+4}$$

$$x=2 \quad \frac{4}{0} = -\infty$$

$$x=1 \quad \frac{3}{1-4+4} = 3$$

$$x=3 \quad \frac{5}{9-12+4} = -1$$

$$x=0 \quad \frac{2}{4} = \frac{1}{2}$$

$$Ug(x) = \{(2, 1), (0, 4)\}$$

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

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

$$f(x^2) = \{(1, 2), (\sqrt{3}, -1), (2, 2), (1, 2), (-\sqrt{3}, -1), (-1, 2)\}$$

$$2g(x)+1 = \{(-2, 1), (1, 2), (3, 5), (-1, 1)\}$$

$$2\frac{f}{g} = \{(1, -2), (3, -1)\}$$

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

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

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

$$g(x) = \{(2, 3), (3, 3), (-2, 4)\}$$

$$h = 2f + g = \{(2, 5), (3, 5), (-2, 4)\}$$

$$f(x) = 3x \geq 0 \quad x \geq 0$$

$$\sqrt{3x} - x \geq 0 \quad \sqrt{3x} \geq x \quad 3x \geq x^2$$

$$x^2 - 3x \leq 0 \quad x(x-3) \leq 0$$

$$x \neq 2$$

$$D_f = [0, 3] - \{2\}$$

$$g(x) \begin{cases} x \in \mathbb{Z} & g(x) = 0 \\ x \notin \mathbb{Z} & g(x) = -1 \end{cases}$$

$$D = [0, 3] - \{2\} \cup \mathbb{Z} = \{0, 1, 3\}$$

$$f(x) = \sqrt{5x - x^2 - 4}$$

$$x = 1 = \sqrt{5 - 1 - 4} = 0$$

$$x = 2 = \sqrt{10 - 4 - 4} = \sqrt{2}$$

$$x = 4 = \sqrt{20 - 16 - 4} = 0$$

$$x = 5 = \sqrt{25 - 25 - 4} = x$$

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

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$$\text{الف) } y = (x-1)^3 + 1 \quad y-1 = (x-1)^3$$

$$\sqrt[3]{y-1} + 1 = x \quad R_f = \mathbb{R}$$

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$$\text{ب) } yx^2 - 2yx - 1 = 0$$

$$\Delta = 4y^2 + 4y$$

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

$$2y \rightarrow y \neq 0$$

$$4y(y+1) \geq 0$$

$$\begin{array}{cc} -1 & 0 \\ + & - & - & + \end{array}$$

$$R_f = (-\infty, -1] \cup [0, +\infty)$$

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$$\text{الف) } \min = \frac{-\Delta}{4a} = \frac{-(14 - \frac{1}{4})}{4} = \frac{1}{4}$$

$$R_f = [\frac{1}{4}, +\infty)$$

$$\text{ب) } \max = \frac{-(14 + 12)}{4} = -12$$

$$R_f = (-\infty, -12]$$

$$\text{ج) } \min = \frac{-(14 + 12)}{4} = -12$$

$$[1, +\infty) \rightarrow \sqrt{0}, +\infty)$$

$$\text{د) } \min = \frac{-(14)}{4} = -9$$

$$(-\infty, -9] \rightarrow \sqrt{0}, 3] = R_f$$

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الف) $\mathbb{R}$

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ب) $\mathbb{R}$

ج) $\sqrt{\mathbb{R}} = [0, +\infty)$

د) $\sqrt{y} = \sqrt{x^2 - 4x^2 + 2x + 1} = \sqrt{\mathbb{R}} = [0, +\infty)$

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الف) $\mathbb{R} - \{3\}$

ج

ب) $\mathbb{R} - \{2\}$