

$$f(x) = \sqrt{x+\varepsilon} \sqrt{x-\varepsilon}$$

$$g(x) = \sqrt{x-\varepsilon} \sqrt{x-\varepsilon}$$

$$x \geq 1$$

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

$$\frac{a+b}{c} =$$

$$t = \sqrt{x-\varepsilon} \rightarrow f(x) = \sqrt{t^2 + \varepsilon t + \varepsilon} = t + \varepsilon, \quad g(x) = \sqrt{t^2 - \varepsilon t + \varepsilon} = t - \varepsilon$$

$$f(x) + g(x) = 2t = 2\sqrt{x-\varepsilon} = a + b\sqrt{x+c} \Rightarrow \frac{a+b}{c} = \frac{0+\varepsilon}{-\varepsilon} = \boxed{-\frac{1}{\varepsilon}}$$

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

$$g(x) = \{(1,1)(1,0)(\varepsilon,0)(0,\varepsilon)\}$$

$$\frac{g}{f}$$

$$f(x) = \frac{x+\varepsilon}{(x-\varepsilon)(x-1)} = \frac{1}{x-1} + \frac{\varepsilon}{x-\varepsilon} \Rightarrow x \neq 1, \varepsilon$$

$$f(0) = \frac{\varepsilon}{\varepsilon} = 1 \Rightarrow \frac{g(0)}{f(0)} = \frac{\varepsilon}{1} = \boxed{4}$$

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

$$f(\varepsilon) = \frac{\varepsilon}{-\varepsilon} = -1 \Rightarrow \frac{g(\varepsilon)}{f(\varepsilon)} = \boxed{-\frac{1}{\varepsilon}}$$

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

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

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

$$b) f(x^2) = \{(\varepsilon, 2)(\sqrt{\varepsilon}, -1)(\varepsilon, 2)(-\frac{1}{\sqrt{\varepsilon}}, \varepsilon)\} \Rightarrow \{(-1,2)(1,2)(-\sqrt{\varepsilon}, -1)(\sqrt{\varepsilon}, -1)(-2,2)(\varepsilon, 2)\}$$

$$c) \varepsilon g^2(x) + 1 = \{(-2, 19)(1, 2)(\varepsilon, 9)(-1, 1)\}$$

$$d) \frac{\varepsilon f}{g} = \{(-1, \frac{19}{\varepsilon})(1, \frac{\varepsilon}{-1})(\varepsilon, \frac{2}{\varepsilon})\} \Rightarrow \{(1, -4)(\varepsilon, -1)\}$$

حسنا سرفان B

الف) $y = x^2 - 4x + 10$ $\min$ ext $\left| \begin{array}{l} \frac{-b}{2a} = \frac{4}{2} = 2 \\ \frac{\Delta}{4a} = 4 \end{array} \right| [4, +\infty)$

ب) $y = -x^2 + 4x + 3$ $\max$ ext $\left| \begin{array}{l} \frac{-b}{2a} = \frac{-4}{-2} = 2 \\ \frac{\Delta}{4a} = 12 \end{array} \right| (-\infty, 12]$

ج) $y = \sqrt{x^2 - 4x - 3}$ $\min$ ext $\left| \begin{array}{l} \frac{-b}{2a} = \frac{2}{1} = 2 \\ \frac{\Delta}{4a} = -4 \end{array} \right| \sqrt{[-4, +\infty)} \Rightarrow [0, +\infty)$

د) $y = \sqrt{4x - x^2}$ $\max$ ext $\left| \begin{array}{l} \frac{-b}{2a} = \frac{2}{-1} = -2 \\ \frac{\Delta}{4a} = 4 \end{array} \right| \sqrt{(-\infty, 4]} \Rightarrow [0, 2]$

الف) $y = x^2 - 4x + 1$ $R_f = R$

ب) $y = x^2 - 4x + 3$ $R_f = R$

ج) $y = \sqrt{x^2 - 4x + 5}$ $R_f = \sqrt{R} \Rightarrow R_f = [0, +\infty)$

د) $y = (x^2 - 4x + 1)^2$ $R_f \geq 0 \Rightarrow [0, +\infty)$

الف) $y = \frac{3x+1}{x-2}$

$R_f = R - \{2\}$

ب) $y = \frac{2x+1}{x+1}$

$R_f = R - \{1\}$

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