

$$f(x) + g(x) = t \Rightarrow t^2 = x + \sqrt{x-4} + x - \sqrt{x-4} + 2\sqrt{x^2-19(x-4)}$$

$$= 2x + 2\sqrt{(x-4)^2} \xrightarrow{x \geq 4} t = \sqrt{x-4} = \sqrt{4(x-4)} \Rightarrow a=0, b=2, c=-4$$

$$\Rightarrow \frac{a+b}{c} = \frac{0+2}{-4} = \left(-\frac{1}{2}\right)$$

$$f(x) = \frac{x+1}{(x-1)(x-3)} \Rightarrow D_f = \mathbb{R} - \{1, 3\} \Rightarrow D_{\frac{g}{f}} = \{2, 0\}$$

$$\Rightarrow \left(\frac{g}{f} = \left\{\left(2, -\frac{1}{2}\right), (0, 6)\right\}\right)$$

الف) $f(2x) = \left\{\left(\frac{1}{2}, 2\right), \left(\frac{3}{2}, -1\right), (2, 2), \left(-\frac{1}{2}, 6\right)\right\}$

ب) $f(x') = \left\{(-1, 2), (1, 2), (-\sqrt{3}, -1), (\sqrt{3}, -1), (-2, 2), (2, 2)\right\}$

ج) $2g^2(x) + 1 = \left\{(-2, 9), (1, 3), (3, 9), (-1, 1)\right\}$

د) $\frac{2f}{g} = \left\{(1, -4), (3, -1)\right\}$

$$h(x) = \left\{(2, 5), (3, 5), (-2, 6)\right\}$$

$$\left\{\begin{array}{l} \sqrt{3x} - x \geq 0 \Rightarrow x^2 - 3x \leq 0 \Rightarrow 0 \leq x \leq 3 \\ x-1 \neq 0 \Rightarrow x \neq 1 \end{array}\right\} \Rightarrow D_f = [0, 3] - \{1\}$$

$$D_{g+1} = \mathbb{R}$$

if $x \in \mathbb{Z} \Rightarrow [x] + [-x] + 1 = 1 \Rightarrow D\left(\frac{f}{g+1}\right) = \{x \in \mathbb{Z} \mid 0 \leq x \leq 3, x \neq 1\}$

if $x \notin \mathbb{Z} \Rightarrow [x] + [-x] + 1 = 0 \Rightarrow D\left(\frac{f}{g+1}\right) = \{0, 1, 3\}$

$$f(x) = \sqrt{-(x-1)(x-4)} \Rightarrow D_f = [1, 4]$$

$$\Rightarrow h(x) = \left\{ (1, 0), \left(\frac{5}{2}, \frac{\sqrt{3}}{2} \right), (4, 0) \right\}$$

$$\text{الف) } y-1 = x^3 - 3x^2 + 3x - 1 = (x-1)^3 \Rightarrow x-1 = \sqrt[3]{y-1} \Rightarrow$$

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

$$\text{ب) } x' - 2x = \frac{1}{y} \Rightarrow x' - 2x + 1 = \frac{y+1}{y} \Rightarrow (x-1)' = \frac{y+1}{y}$$

$$\Rightarrow x-1 = \pm \sqrt{\frac{y+1}{y}} \Rightarrow x = \pm \sqrt{\frac{y+1}{y}} + 1 \Rightarrow \frac{y+1}{y} \geq 0 \Rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$$

$$\text{الف) } x_5 = \frac{5}{2} = 2 \Rightarrow y_5 = 5 \Rightarrow R_f = [5, +\infty)$$

$$\text{ب) } x_5 = \frac{5}{-2} = -2 \Rightarrow y_5 = 1 \Rightarrow R_f = (-\infty, 1]$$

$$\text{ج) } x_5 = \frac{5}{2} = 2 \Rightarrow y_5 = -1 \Rightarrow R_f = [0, +\infty)$$

$$\text{د) } x_5 = \frac{5}{-2} = -2 \Rightarrow y_5 = 9 \Rightarrow R_f = [0, 9]$$

$$\text{الف) } R_f = \mathbb{R}$$

$$\text{ب) } R_f = \mathbb{R}$$

$$\text{ج) } R_f = [0, +\infty)$$

$$\text{د) } R_f = [0, +\infty)$$

$$\text{الف) } R_f = \mathbb{R} - \{3\}$$

$$\text{ب) } R_f = \mathbb{R} - \{4\}$$