

$$y = \sqrt{9x f(x)} \xrightarrow{\text{بمربع}} 9x f(x) \geq 0$$

$$f(x) \geq \frac{0}{9x} = 0$$

$$9x f(x) \geq 0$$

$$\begin{array}{c|cccc} & -5 & 0 & 2 & 5 \\ \hline & - & + & - & + & - \end{array}$$

$$[-5, 0] \cup [2, 5]$$

$$y = \sqrt{\frac{-x}{f(x)}}$$

$$\frac{-x}{f(x)} \geq 0$$

$$\rightarrow -x \geq 0 \rightarrow x \leq 0$$

$$\begin{array}{c|cccc} & -2 & 0 & 2 & 5 \\ \hline & - & + & - & + & - \end{array}$$

$$(-2, 0) \cup (0, 2)$$

$$1 < -1 < -2$$

$$f(x) - 2f(1) = x^2 - 2x + 4 \rightarrow f(2) - 2f(1) = 4 - 2 + 4 \rightarrow -f(2) = 2 \rightarrow f(2) = -2$$

$$f(-2) + 4 = 4 + 4 + 4 \rightarrow f(-2) = 10$$

ابتدا x را 2 می گذاریم
سپس $f(2)$ را بدست می آوریم و جایگذاری می کنیم
سپس به جای x منفی 2 می گذاریم تا $f(-2)$ را بدست آوریم

$$f(f(5)) + f(f(1))$$

$$\begin{aligned} 2(1) + 2 &= 4 \\ 5 - \sqrt{5+4} &= 2 \\ 2(2) + 2 &= 6 \end{aligned}$$

$$\underbrace{f(f(5))}_{2} + 2 = 7 + 2 = 9$$

$$f(x-1) - f(x) = 4x + 2$$

$$f(x) = ax^2 - bx + 2$$

$$a(x-1)^2 - b(x-1) + 2 - ax^2 + bx - 2 = 4x + 2$$

$$ax^2 - 2ax + a - bx + b + 2 - ax^2 + bx - 2 = 4x + 2$$

$$-2ax + b + a = 4x + 2$$

$$a - b = -2 \quad a = -1$$

$$-2ax = 4x \rightarrow a = -2$$

$$\begin{aligned} a + b &= 2 \\ -2 + b &= 2 \quad b = 4 \end{aligned}$$

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

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

$$\frac{1 - 4\sqrt{x} + 4 + 4\sqrt{x} - 8 + 4}{1 - 4\sqrt{x} + 4 + 4\sqrt{x} - 8 + 4} = \frac{1}{1} = 1$$

$$f\left(x - \frac{1}{x}\right) = \frac{x^2 + 1}{x^2} \quad f\left(x - \frac{1}{x}\right) = x^2 + \frac{1}{x^2}$$

$$\frac{x^2 + 1}{x^2} = \left(x - \frac{1}{x}\right)^2 + 2$$

$$f\left(x - \frac{1}{x}\right) = \left(x - \frac{1}{x}\right)^2 + 2$$

$$f(2) = (2)^2 + 2 = 11$$

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

$$g(x) = \sqrt{9 - x^2} \rightarrow 9 - x^2 \geq 0 \Rightarrow 9 \geq x^2 \Rightarrow x = [-3, 3]$$

$$D_f \cap D_g = \left\{ \frac{1}{\sqrt{2}}, 1, 0 \right\}$$

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

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

$$\text{ب) } f(x) + 1 = \{(2, 2), (2, 2), (-2, 2), (1, -1)\}$$

$$\text{ج) } 3f^2(x) + 1 = \{(2, 4), (2, 4), (-2, 4), (1, 1)\}$$

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

$$\text{ا) } f - g = \{(1, 4), (2, 2), (3, 2)\}$$

$$D_f \cap D_g = \{1, 2, 3\}$$

$$\text{ب) } \frac{2f}{g} = \left\{ \left(\frac{1}{2}, 2 \right), (2, 2), (2, 2) \right\}$$