

$$y = \sqrt{x f(x)} \rightarrow x f(x) \geq 0 \xrightarrow{\text{ریشه ها}} x=0 \quad x=2 \quad x=0 \quad x=-0$$

$$Df = [-0, 0] \cup [2, 0]$$

-0	0	2	0
-	+	-	+

$$y = \sqrt{\frac{-x}{f(x)}} \rightarrow \frac{-x}{f(x)} \geq 0 \longrightarrow x=0 \quad x=2 \quad x=-2 \quad x=0 \quad x=0$$

$$Df = [-2, 2]$$

$$\underbrace{-2, -1, 0, 1, 2}_{\text{در } 0}$$

-2	0	2	0
-	+	+	-

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

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

$$\left. \begin{aligned} f(0) = 0 - \sqrt{9} = 0 - 3 = -3 \rightarrow f(f(0)) = f(-3) = 9 + 3 = 12 \\ f(1) = 2 + 3 = 5 \rightarrow f(f(1)) = f(5) = 2 \end{aligned} \right\} \quad 12 + 2 = 14$$

$$\begin{aligned} x=1 \rightarrow f(0) - f(1) &= 4 + 2 = 6 & f(0) &= 2 & f(1) &= a - b + 2 \\ 2 - (a - b + 2) &= 6 \rightarrow 2 - a + b - 2 &= 6 \rightarrow \underline{a - b} &= -6 \end{aligned}$$

$$f(x) = \frac{(x+1)^2 + 1}{(x+1)^2 + 3}$$

$$f(\sqrt{3}-1) = \frac{(\sqrt{3}-1+1)^2 + 1}{(\sqrt{3}-1+1)^2 + 3} = \frac{2}{4} = \frac{1}{2}$$

$$f\left(x - \frac{1}{x}\right) = \frac{x^4}{x^2} + \frac{1}{x^2} = x^2 + \frac{1}{x^2} \rightarrow f\left(x - \frac{1}{x}\right) = \left(x - \frac{1}{x}\right)^2 + 2$$

$$f(-3) = (-3)^2 + 2 = 9 + 2 = 11$$

الف $\frac{f}{g}$

$$g(x) = \sqrt{9-x^2} \rightarrow 9-x^2 \geq 0 \rightarrow 9 \geq x^2 \rightarrow -3 < x < 3$$

$$Dg \cap Df \rightarrow 0, 1, 2$$

$$\frac{f}{g} = \left\{ \left(0, \frac{1}{3}\right), \left(1, \frac{\sqrt{2}}{2}\right), \left(2, \frac{0}{2}\right) \right\}$$

$$\text{ب) } \frac{g}{f} = \left\{ \left(0, \frac{3}{1}\right), \left(1, \frac{\sqrt{2}}{2}\right), \left(2, \frac{0}{2}\right) \right\} = \left\{ \left(0, \frac{3}{1}\right), \left(1, \frac{\sqrt{2}}{2}\right) \right\}$$

$$\text{الف) } 2f(x) = \left\{ (2, 2), (3, 8), (-5, 4), (1, -4) \right\}$$

$$\text{ب) } f(x)+1 = \left\{ (2, 1), (3, 9), (-5, 3), (1, -1) \right\}$$

$$\text{ج) } 2f^2(x)+1 = \left\{ (2, 4), (3, 49), (-5, 13), (1, 13) \right\}$$

$$\text{د) } f(2x) = \left\{ (1, 1), \left(\frac{3}{2}, 3\right), \left(-\frac{5}{2}, 2\right), \left(\frac{1}{2}, -1\right) \right\}$$

$$\text{الف) } f-g = \left\{ (1, 3), (2, 2), (3, 1) \right\}$$

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