

سوال ۱۱

$$x + 2\sqrt{x-1} = t^2 + t + 1 + (t+2)^2$$

$$f(x) = |t+2| = \sqrt{(x-1)+1}$$

$$x - 2\sqrt{x-1} = t^2 + 1 - t + (t-2)^2$$

$$g(x) = |t-2| = \sqrt{x-1}$$

$$g(x) = \sqrt{x-1} - 2$$

$$f(x) + g(x) = \sqrt{x-1} + 2 + \sqrt{x-1} - 2 = 2\sqrt{x-1}$$

$$\begin{matrix} a=0 \\ b=2 \\ c=-2 \end{matrix}$$

$$\frac{0+2}{-2} = -\frac{1}{1}$$

سوال ۱۲

$$x^2 - 4x + 3 = (x-1)(x-3) = 0 \quad x \neq 1, 3$$

$$f(x) = \frac{x+2}{-1} = -x-2 \quad f(0) = -2 \quad g(0) = 2 \quad g(1) = 1$$

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

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

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

$$\text{الف) } x=1 \Rightarrow x = \frac{1}{1} \Rightarrow f=2$$

$$x=3 \Rightarrow x = \frac{3}{1} \Rightarrow f=-1$$

سوال ۱۳

$$x=-1 \Rightarrow x = -\frac{1}{1} \Rightarrow f=4$$

$$x=2 \Rightarrow f=2$$

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

$$\text{ب) } x^2=1 \Rightarrow x=\pm 1 \quad x^2=3 \Rightarrow x=\pm\sqrt{3} \quad x^2=4 \Rightarrow x=\pm 2$$

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

$$\text{ج) } x=2 \quad 2(2)^2+1=9 \quad x=-1 \quad 2(-1)^2+1=3$$

$$x=3 \quad 2(3)^2+1=19 \quad x=-1 \quad 2(0)^2+1=1$$

$$f \circ g(x) + 1 = \left\{ (-2, 19), (1, 3), (2, 9), (-1, 1) \right\}$$

$$\text{د) } \frac{f(-1)}{g(-1)} = \frac{f(2)}{1} = 12 \quad \frac{f(1)}{-1} = -2$$

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

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

سوال ۴

$$x=2 \Rightarrow h(2) = 2(1) + 3 = 5$$

$$x=3 \Rightarrow h(3) = 2(1) + 3 = 8$$

$$h(-2) = 2(0) + 4 = 4$$

$$h = \{(1, 5), (2, 8), (-2, 4)\}$$

$$x \geq 0 \Rightarrow x \geq 0$$

$$\sqrt{3x} - x \geq 0 \Rightarrow \sqrt{3x} \geq x$$

$$0 \leq x \leq 3 \Rightarrow x \neq 2$$

$$g(x) = -1 \Rightarrow g(x) + 1 \neq 0$$

$$g(x) = [x] + [-x] \Rightarrow g(x) = 0$$

$$D = \{0, 1, 2\}$$

$$h(x) = \frac{f(x)}{g(x)}$$

$$f(1) = 1$$

$$h(1) = 0$$

$$f(2) = 2$$

$$h(2) = \frac{2}{2} = 1$$

$$f(2) = 2$$

$$h(2) = 1$$

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

سوال ۶

$$y = (x-1)^2 + 1 \quad (x-1)^2 \in \mathbb{R}$$

$$R_y = \mathbb{R}$$

سوال ۷

$$x^2 - 2x = (x-1)^2 - 1 \quad \text{سازگار}$$

$$x^2 - 2x \in [-1, +\infty)$$

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

$$y = (x-2)^2 + 4 \quad \text{حاصل مقدار}$$

$$R_y = [4, +\infty)$$

سوال ۸

$$y = -(x-3)^2 + 12 \quad \text{حاصل مقدار}$$

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

$$x^2 - 6x + 9 = (x-3)^2 - 7$$

$$R_y = [0, +\infty)$$

$$y = \sqrt{4x - x^2} \quad 4x - x^2 \leq 4 - (x-2)^2 \quad 0 \leq 4x - x^2 \leq 4$$

$$0 \leq y \leq 2 \quad R_y = [0, 2]$$

الف) $R_y = R$ تمام حیدر علیہ السلام سے

ب) $R_y = R$ تمام حیدر علیہ السلام سے بااثرین کو ان فردا سے

ج) $R_y = [0, +\infty)$ داخل ازبکال سے حیدر علیہ السلام سے بااثرین کو ان فردا سے

د) $R_y = [0, +\infty)$ تمام مربع اصل سے دے دے

الف) $R_y = R - \{\frac{a}{c}\} \Rightarrow R_y = R - \{2\}$

ب) $R_y = R - \{\frac{a}{c}\} \Rightarrow R_y = R - \{2\}$

سوال ۱۰