

$$A \times B = \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2), (3, 3)\}$$

$$B^2 = \{(2, 2), (2, 3), (3, 2), (3, 3)\}$$

$$\Rightarrow A \times B - B^2 = \{(1, 2), (1, 3)\}$$

1

$$f(n) = \{(m^2, m^2), (2, 1), (-3, m), (-2, m), (m, m+2), (m, 4)\}$$

$$\{(m^2, m^2) \in f(m), (2, m+2) \in f(m)\} \Rightarrow m+2 = m^2 \Rightarrow m < -1$$

$$m=2 \rightarrow (m, 4) = (2, 4), (2, -1) \rightarrow f(m) \text{ نیست} \quad \boxed{m=-1} \rightarrow f(m) \text{ نیست}$$

2

$$g(n) = \{(m^2, m^2), (2, 1), (m, 4), (2, m+2), (-2, m), (-1, 3)\}$$

$$(m^2, m^2), (2, m+2) \in f(m) \Rightarrow m = -1 \quad m = -1 \rightarrow (-1, 4), (-1, 3) \in f(m) \Rightarrow \text{تابع نیست}$$

$$\boxed{m=2} \rightarrow g(m) \text{ نیست}$$

$$f(n) = \begin{cases} n^2 - 1 & ; n \leq 1 \\ an + b & ; 1 \leq n \leq 2 \\ n^2 & ; n \geq 2 \end{cases}$$

$$\left. \begin{array}{l} n=1 \Rightarrow n^2 - 1 = 0 \\ n=1 \Rightarrow a + b \\ n=2 \Rightarrow 2a + b \\ n=2 = n^2 = 4 \end{array} \right\} \Rightarrow \begin{cases} a + b = 0 \\ a = -b \\ 2a + b = 4 \end{cases} \Rightarrow \begin{cases} a = 1 \\ b = -1 \end{cases}$$

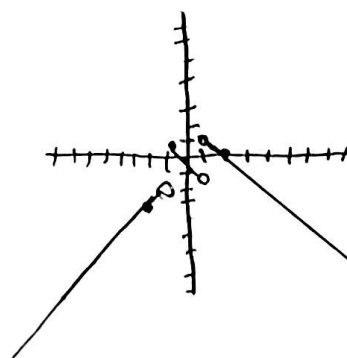
$$\Rightarrow \boxed{a \times b = -4}$$

3

$$n = k \Rightarrow 2k - 3 = 5 - 3k \Rightarrow 5k = 8 \Rightarrow k = \frac{8}{5}$$

4

$$f(n) = \begin{cases} -n + 2 & ; n > 1 \\ -n & ; -1 \leq n \leq 1 \\ n - 1 & ; n < -1 \end{cases}$$



5

$$\text{الف)} \quad \begin{cases} 2y^3 = -(x^2+1) \\ -(x_1^2+1) = 2y_1^3 \\ -(x_2^2+1) = 2y_2^3 \end{cases} \xrightarrow{n=1,2} 2y_1^3 = 2y_2^3 \Rightarrow y_1^3 = y_2^3 \Rightarrow y_1 = y_2 \text{ تابع است}$$

$$\begin{aligned} & -(x^2 - 2x + 1) + (2y^2 - 12y + 9) = 0 \Rightarrow (x^2 - 2x + 1) = -(2y^2 - 12y + 9) \\ & \Rightarrow (x-1)^2 = -(y-3)^2 \end{aligned}$$

دو عبارت همواره منفی و همواره مثبت با هم برابرند پس حاصل این دو صفر است

$$\Rightarrow x=1, y=3 \Rightarrow f(x) = \{(1, 3)\} \rightarrow \text{تابع یک نقطه}$$

$$\text{الف)} \quad y \sin x = x \sin y \quad | \quad x=y=0 \Rightarrow y \in \mathbb{R} \rightarrow \text{تابع صفر است}$$

$$\begin{aligned} & \rightarrow \sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \Rightarrow \frac{x}{y} + \frac{y}{x} + 2 = 4 \Rightarrow \frac{x}{y} + \frac{y}{x} = 2 \\ & \Rightarrow x^2 + y^2 - 2xy = 0 \Rightarrow (x-y)^2 = 0 \Rightarrow x-y=0 \Rightarrow x=y \end{aligned}$$

$$\boxed{\begin{matrix} x=y \\ x \neq 0 \end{matrix}} \rightarrow \text{تابع صفر}$$

$$\text{الف)} \quad y = \sqrt{\frac{x-1}{x-2}} + \sqrt{\frac{2-x}{x}}$$

$$(\mathbb{R} - (1, 2)) \cap (0, 2] = (0, 1] \Rightarrow D_f = [0, 1] \quad (D_f = (0, 1])$$

$$\begin{aligned} & \rightarrow \sqrt{x} + \sqrt{y-1} = \sqrt{3} \Rightarrow \sqrt{x} - \sqrt{3} = -\sqrt{y-1} \quad | \quad \sqrt{3} - \sqrt{x} = \sqrt{y-1} \\ & \Rightarrow \sqrt{y-1} \geq 0 \quad x \in [0, 3] \Rightarrow D_f = [0, 3] \end{aligned}$$

$$\text{الف)} \quad y = \frac{\sqrt{x^2 - 2x + 2}}{\sqrt{x^2 - 10x + 16}} \quad x=1, 2 \rightarrow \text{تابع صفر}$$

$$(\mathbb{R} - \{1, 2\}) \cap (\mathbb{R} - (1, 2)) = \mathbb{R} - (1, 2) \Rightarrow D_f = \mathbb{R} - (1, 2)$$

$$\begin{aligned} & \rightarrow y = \frac{\sqrt{x^2 - 2x + 2}}{\sqrt{x^2 - 10x + 16}} \Rightarrow x=1, 2, 4, 8 \\ & D_f = \mathbb{R} - ((1, 2) \cup (4, 8)) \end{aligned}$$

$$\text{الف)} \quad y = \frac{\sqrt{2x^2 - 8x + 10}}{\sqrt{2x^2 - 2x + 2}} \rightarrow x = \frac{1}{2} \rightarrow \text{تابع صفر}$$

$$(\mathbb{R} - (1, \frac{3}{2})) \cap (\mathbb{R} - [1, \frac{5}{2}]) = \mathbb{R} - [1, \frac{5}{2})$$

$$\begin{aligned} & \rightarrow y = \frac{\sqrt{2x^2 - 8x + 10}}{\sqrt{2x^2 - 2x + 2}} \Rightarrow x = (\frac{1}{2}, \frac{5}{2}) \cup [1, 3] \\ & D_f = \mathbb{R} - ((\frac{1}{2}, \frac{5}{2}) \cup [1, 3]) \end{aligned}$$