

$$A = \{1, 2, 3\}$$

$$B = \{2, 3\}$$

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

$$\Rightarrow \{(1, 2)(1, 3)\}$$



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$$a) f(x) = \{(x, \frac{m^2}{x})(x, -1)(-x, m)(-x, m+1)(m, \frac{x}{m})\} \rightarrow m^2 = m+1 \rightarrow m^2 - m - 1 = 0 \rightarrow (m-2)(m+1) = 0$$

$$m \begin{cases} x \rightarrow x \\ -1 \rightarrow \checkmark \end{cases} \Rightarrow \boxed{m = -1}$$



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$$b) g(x) = \{(x, \frac{m^2}{x})(x, 1)(m, \frac{x}{m})(x, m+1)(-x, m)(-1, \frac{x}{m})\} \rightarrow m^2 = m+1 \rightarrow m^2 - m - 1 = 0 \rightarrow (m-2)(m+1) = 0$$

$$m \begin{cases} x \rightarrow x \\ -1 \rightarrow x \end{cases} \rightarrow m, \text{ هر دو}$$

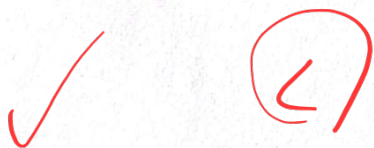
$$f(x) = \begin{cases} x^2 - 1 & : x \leq 1 \rightarrow ax + b = x^2 - 1 \xrightarrow{x=1} 1 - 1 = 0 \\ ax + b & : 1 \leq x \leq 2 \\ x^2 & : x \geq 2 \rightarrow ax + b = x^2 \xrightarrow{x=2} 4a + b = 4 \end{cases}$$

$$\begin{cases} a + b = 0 \\ 4a + b = 4 \end{cases} \rightarrow \begin{matrix} a = 1 \\ b = -1 \end{matrix} \quad \boxed{axb = -4x}$$



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$$f(x) = \begin{cases} x^2 - 3 & : x \geq k \\ x^2 & : x \leq k \end{cases} \xrightarrow{x=k} k^2 - 3 = 3 - k^2 \rightarrow 2k = 3 \rightarrow \boxed{k = \frac{3}{2}}$$

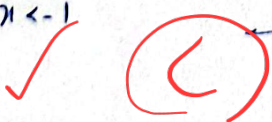
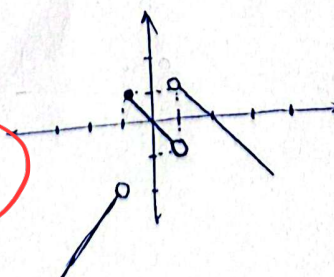


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$$f(x) = \begin{cases} -x + 2 & : x > 1 \\ -x & : -1 \leq x \leq 1 \\ x - 1 & : x < -1 \end{cases}$$

$$D_f = \mathbb{R} - \{1\}$$

$$R_f = (-\infty, 1]$$



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$$\text{a)} \quad xy^r + x^r + 1 = 0 \xrightarrow{\text{فرض}} \begin{cases} xy_1^r = -x^r + 1 \\ xy_r^r = -x^r + 1 \end{cases} \Rightarrow y_1^r = y_r^r \rightarrow y_1^r = y_r^r \quad \boxed{y_1 = y_r} \text{ تابع است } \checkmark$$

$$\text{ب)} \quad x^r + xy^r - x - 1 = 0 \xrightarrow{\text{فرض}} xy^r - 1 = x - 1 \rightarrow (xy + 1)^r = (x - 1)^r \xrightarrow{\text{فرض}} y = -\frac{1}{x} \quad \checkmark \text{ تابع است } \checkmark$$

$$\text{a)} \quad x \sin y = y \sin x \xrightarrow{\text{فرض}} x = \frac{\pi}{r} \rightarrow \frac{\pi}{r} \sin y = 1 \times y \rightarrow \frac{\pi}{r} \sin y = y \quad \begin{cases} y = \frac{\pi}{r} \\ y = -\frac{\pi}{r} \end{cases} \quad x \subseteq \text{مربع}$$

$$\text{ب)} \quad \left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = r \right)^2 \rightarrow \frac{x}{y} + \frac{y}{x} + 2 = r^2 \rightarrow \frac{x^2 + y^2}{xy} = r^2 \rightarrow x^2 - r^2 xy + y^2 = 0 \rightarrow (x - y)^2 = 0 \rightarrow x = y \quad \checkmark \text{ تابع است } \checkmark$$

$$\text{a)} \quad y = \sqrt{\frac{x-1}{x-4}} + \sqrt{\frac{4-x}{x}} \quad + \frac{1}{\frac{1}{0} - \frac{1}{0}} \quad - \frac{0}{\frac{1}{0} - \frac{1}{0}} \quad [\cap \mathbb{I} \rightarrow D_y = (0, 1)]$$

$$\text{ب)} \quad \sqrt{x} + \sqrt{y-1} = \sqrt{3} \rightarrow (\sqrt{y-1} = \sqrt{3} - \sqrt{x})^2 \rightarrow y-1 = 3 + x - 2\sqrt{3x} \rightarrow y = x + 4 - 2\sqrt{3x} \quad \sqrt{x} \leq \sqrt{3} \rightarrow x \leq 3 \quad D_y = [0, +\infty) \quad D = [0, 3]$$

$$\text{a)} \quad y = \frac{\sqrt{x^2 - 5x + 4}}{\sqrt{x^2 - 10x + 14}} \Rightarrow \frac{\sqrt{(x-1)(x-4)}}{\sqrt{-9x + 14}} \rightarrow + \frac{1}{\frac{1}{0} - \frac{4}{0}} \quad \cap \Rightarrow D_y = (-\infty, 1]$$

$$\text{ب)} \quad y = \frac{\sqrt{x^2 - 5x + 4}}{\sqrt{x^2 - 10x + 14}} \Rightarrow \frac{\sqrt{(x-1)(x-4)}}{\sqrt{(x-2)(x-7)}} \rightarrow + \frac{1}{\frac{1}{0} - \frac{4}{0}} + \frac{1}{\frac{1}{0} - \frac{7}{0}} \quad D_y = (-\infty, 1] \cup (2, 4] \cup (7, +\infty)$$

$$\text{a)} \quad y = \frac{\sqrt{x^2 - 2x + 3}}{\sqrt{x^2 - 5x + 4}} = \frac{\sqrt{(x-1)(x-3)}}{\sqrt{(x-1)(x-4)}} \rightarrow + \frac{1}{\frac{1}{0} - \frac{3}{0}} \quad \cap \rightarrow D_y = (-\infty, 1) \cup \left[\frac{3}{4}, +\infty \right)$$

$$\text{ب)} \quad y = \frac{\sqrt{x^2 - 2x + 3}}{\sqrt{x^2 - 5x + 4}} = \frac{\sqrt{(x-1)(x-3)}}{\sqrt{(x-1)(x-4)}} \rightarrow + \frac{1}{\frac{1}{0} - \frac{3}{0}} + \frac{1}{\frac{1}{0} - \frac{4}{0}} \rightarrow D_y = (-\infty, 1) \cup \left(1, \frac{3}{4} \right) \cup \left[\frac{3}{4}, +\infty \right)$$