

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

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

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

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

$$m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow (m-2)(m+1) = 0 \Rightarrow m = +2 \text{ or } m = -1$$

$$m = 2 \text{ or } m = -1 \Rightarrow (2, 1) \text{ and } (2, 4) \text{ are not possible} \quad m = -1 \checkmark$$

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

$$m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow (m-2)(m+1) = 0 \Rightarrow m = 2 \text{ or } m = -1 \quad \text{غير قابل قبول}$$

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

$$\hookrightarrow x = 2 \quad ax + b = x^2 \Rightarrow 2a + b = 1 \quad \frac{a = -b}{-2b + b = 1} \quad -b = 1 \quad b = -1$$

$$ax + b = -4 \quad \frac{b = -1}{a = +1}$$

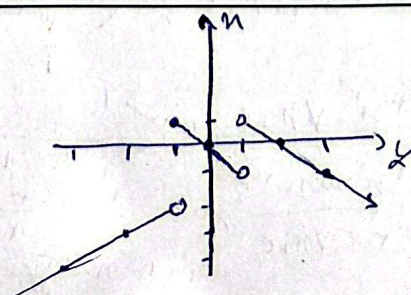
$$f(x) = \begin{cases} 2x - 3 & x \geq 1 \\ 4 - 3x & x \leq 1 \end{cases}$$

$$2x - 3 = 4 - 3x$$

$$5x = 7 \Rightarrow x = \frac{7}{5} \Rightarrow 1 < \frac{7}{5}$$

$$f(x) = \begin{cases} -x + 1 & x > 1 \hookrightarrow \begin{array}{c|c|c} 1 & 2 & 3 \\ \hline 1 & 0 & -1 \end{array} \\ -x & -1 \leq x < 1 \hookrightarrow \begin{array}{c|c|c} 1 & 0 & -1 \\ \hline +1 & 0 & -1 \end{array} \\ x - 1 & x < -1 \end{cases}$$

$$\begin{array}{c|c|c} -1 & -2 & -3 \\ \hline -2 & -3 & -4 \end{array}$$



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

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

$$\text{الف) } 2x^3 + x^2 + 1 = 0 \xrightarrow{x_1 = x_2} \begin{cases} y_1^3 = -\frac{x_1^2 - 1}{2} \\ y_2^3 = -\frac{x_2^2 - 1}{2} \end{cases} \Rightarrow y_1^3 = y_2^3 \Rightarrow y_1 = y_2$$

من تابع است

$$\text{ب) } n^2 + x^2 - 2x + 1 = 0$$

$$(n-1)^2 + (2x-3)^2 = 0$$

$$\hookrightarrow n-1=0 \hookrightarrow n=1 \quad 2x-3=0 \hookrightarrow x=\frac{3}{2}$$

جواب است $(1, \frac{3}{2})$ فقط یکی



$$\text{الف) } x \sin y = y \sin x \hookrightarrow x=0$$

$$0 \times \sin y = y \times \sin 0 \Rightarrow 0 = y \times 0 \Rightarrow y \text{ هر عددی}$$

من تابع نیست



$$\text{ب) } \sqrt{\frac{n}{x}} + \sqrt{\frac{x}{n}} = 2$$

$$n, x \neq 0$$

$$\left(\sqrt{\frac{x}{n}} + \sqrt{\frac{n}{x}}\right)^2 = 4 \hookrightarrow \frac{x}{n} + \frac{n}{x} + 2 = 4 \hookrightarrow \frac{x}{n} + \frac{n}{x} = 2 \hookrightarrow \frac{n^2 + x^2}{nx} = 2 \hookrightarrow n^2 + x^2 - 2nx = 0 \hookrightarrow (n-x)^2 = 0 \hookrightarrow n=x$$

$$y = \sqrt{\frac{x+1}{n-3}} + \sqrt{\frac{2-x}{x}} \Rightarrow \frac{x-1}{x-3} > 0 \quad \frac{1}{x-3} > 0 \quad \frac{1}{x-3} > 0 \Rightarrow D = (-\infty, 1] \cup (3, +\infty)$$

$$\frac{2-x}{x} \geq 0 \quad x=0 \quad x=2 \quad \frac{1}{x-3} > 0 \Rightarrow D = [0, 2]$$



$$\text{ب) } \sqrt{x} + \sqrt{x-1} = \sqrt{3}$$

$$\sqrt{x-1} \geq 0 \quad \sqrt{x} \geq 0 \quad \text{I}$$

$$I \cup II \quad n = [0, 3]$$

$$\sqrt{x-1} = \sqrt{3} - \sqrt{x}$$

$$\sqrt{3} - \sqrt{x} \geq 0 \hookrightarrow \sqrt{3} \geq \sqrt{x} \hookrightarrow 3 \geq x \quad \text{II}$$

$$\text{الف) } y = \sqrt{x^2 - 7n + 4} \hookrightarrow x^2 - 7n + 4 \geq 0 \hookrightarrow (n-2)(n-1) \leq \frac{1}{4}$$

$$\frac{1}{x-3} > 0 \Rightarrow D = (-\infty, 1] \cup (3, +\infty)$$

$$(n^2 - 10n + 14) \geq 0 \hookrightarrow n^2 - 10n + 14 \geq 0 \hookrightarrow (n-1)(n-9) < 0 \quad \frac{1}{x-3} > 0 \Rightarrow D = (-\infty, 1] \cup (9, +\infty)$$

$$y = \sqrt{\frac{n^2 - 7n + 4}{n^2 - 10n + 14}} \Rightarrow \frac{n^2 - 7n + 4}{n^2 - 10n + 14} \geq 0 \hookrightarrow \frac{(n-2)(n-1)}{(n-1)(n-9)} \geq 0 \Rightarrow \frac{1}{x-3} > 0 \Rightarrow D = (-\infty, 1] \cup (2, 9] \cup (9, +\infty)$$

$$\text{الف) } y = \sqrt{\frac{2n^2 - 5n + 3}{3n^2 - 7n + 4}} \hookrightarrow \frac{2n^2 - 5n + 3}{3n^2 - 7n + 4} \geq 0 \hookrightarrow \frac{1}{x-3} > 0 \Rightarrow D = (-\infty, 1] \cup \left[\frac{3}{2}, +\infty\right)$$

$$\frac{1}{x-3} > 0 \Rightarrow D = (-\infty, 1) \cup \left[\frac{3}{2}, +\infty\right)$$

$$\text{ب) } y = \sqrt{\frac{2n^2 - 5n + 3}{3n^2 - 7n + 4}} \hookrightarrow \frac{2n^2 - 5n + 3}{3n^2 - 7n + 4} \geq 0 \hookrightarrow n \geq 1 \quad n = \frac{3}{2} \quad n < 1 \quad n = \frac{4}{3}$$



$$D = (-\infty, 1) \cup \left(1, \frac{3}{2}\right) \cup \left[\frac{4}{3}, +\infty\right)$$