

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

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

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

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

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

$$\begin{cases} m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \\ (m-2)(m+1) = 0 \end{cases} \rightarrow \begin{cases} m = 2 \text{ و } 0 \\ m = -1 \end{cases}$$

$m = -1$

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

$$\begin{cases} m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow \begin{cases} m = 2 \\ m = -1 \end{cases} \\ m = 2 \rightarrow (2, 1) \text{ و } (2, 4) \times \\ m = -1 \rightarrow (-1, 2) \text{ و } (-1, 3) \times \end{cases}$$

علاوه بر این، تابع g تابع زوج نیست.

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

$$\begin{aligned} x=1, & 1-1 = a+b = 0 \quad x=2, \quad 4a+b = 4 \\ \begin{cases} -a-b = 0 \\ 4a+b = 4 \end{cases} & \rightarrow a = -1, b = 1 \end{aligned}$$

$$a \times b = 1 \times (-1) = -1$$

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

$$x=h \rightarrow 2h - 2 = 4 - 3h$$

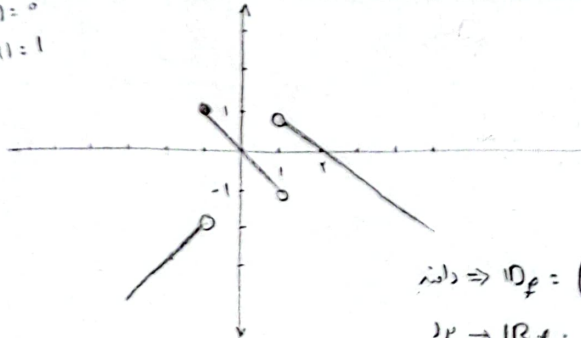
$$5h = 6$$

$$h = \frac{6}{5} \Rightarrow \text{برای } k \geq \frac{6}{5} \text{، عبارت } k \geq \frac{6}{5} \text{، تابع صعودی است.}$$

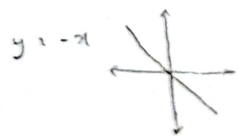
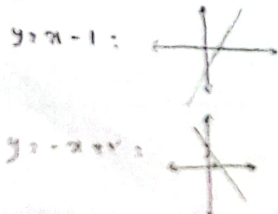
$$f(x) = \begin{cases} -x+2; & x > 1 \\ -x; & -1 \leq x \leq 1 \\ x-1; & x < -1 \end{cases}$$

$$\begin{aligned} x=1, & f(1) = -1 \\ x=-1, & f(-1) = 1 \end{aligned}$$

$$\begin{aligned} f(-1) &= -(-1) = 1 \\ f(1) &= -1 \end{aligned}$$



$$\begin{aligned} \text{دامنه} &\Rightarrow \text{دامنه } f = (-\infty, +\infty) - \{1\} \\ \text{بر} &\Rightarrow \text{بر } f = (-\infty, 1] \end{aligned}$$



الف) $xy^2 + x^2 + 1 = 0$

$x^2 + 1 = -xy^2$
 $x^2 + 1 = -xy^2$ $\left\{ \begin{array}{l} x = y \\ y = x \end{array} \right. \Rightarrow x = y$

تابع هست ✓

ب) $x^2 + 4y^2 - 2x - 12y + 16 = 0$
 $(x^2 - 2x + 1) + (4y^2 - 12y + 9) = 0$
 $(x-1)^2 + (2y-3)^2 = 0$

$\begin{cases} x=1 \\ y=\frac{3}{2} \end{cases}$ نقطه است (1, 1.5)

تابع هست ✓

الف) $x \sin y = y \sin x$

شماره ۱
 $x=0 \Rightarrow 0 \times \sin y = y \times 0$
 $\Rightarrow 0 = y \times 0$

$y \in \mathbb{R}$ تابع نیست چون
 $\Rightarrow X$

ب) $\left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}}\right)^2 = (x)^2$

$\frac{x}{y} + \frac{y}{x} + 2\sqrt{\frac{x}{y} \times \frac{y}{x}} = 4$

$\frac{x^2 + y^2}{xy} = 4 \Rightarrow x^2 + y^2 - 4xy = 0$

$(x-y)^2 = 0 \Rightarrow x=y$ تابع است ✓

الف) $y = \sqrt{\frac{x-1}{x-3}} \geq 0$ $\sqrt{\frac{2-x}{x}} \geq 0$

$\begin{array}{c|ccc} x & 1 & 2 & 3 & 4 \\ \hline & + & 0 & - & + \end{array}$

I: $(-\infty, 1] \cup (3, +\infty)$

II: $(2, +\infty)$

$D_f: I \cap II: (2, 3]$

ب) $\sqrt{x} + \sqrt{y-1} = \sqrt{2}$

$I: x \geq 1, y-1 \geq 0 \Rightarrow \sqrt{2} - \sqrt{x} \geq 0$

$\sqrt{y-1} = \sqrt{2} - \sqrt{x}$

$\sqrt{2} - \sqrt{x} \geq 0 \Rightarrow \sqrt{2} \geq \sqrt{x} \Rightarrow 2 \geq x: II$

$D_f: I \cap II: [1, 2]$

الف) $\sqrt{x^2 - 4x + 4} \geq 0$
 $\sqrt{x^2 - 4x + 4} \geq 0$

$\begin{array}{c|ccc} x & 1 & 2 & 3 & 4 \\ \hline & + & 0 & - & + \end{array}$

ب) $\sqrt{\frac{x^2 - 4x + 4}{x^2 - 4x + 4}} = \sqrt{\frac{(x-1)(x-4)}{(x-2)(x-2)}}$

$D_f: (-\infty, 1] \cup (2, 3] \cup (4, +\infty)$

$D_f: I \cap II$

۱) $\sqrt{-9x+14} \geq 0$
 $x < \frac{14}{9} \Rightarrow II: (-\infty, \frac{14}{9})$
 $\Rightarrow D_f: (-\infty, 1]$

۲) $\sqrt{x^2 - 4x + 4} \geq 0$
 $\Rightarrow \sqrt{(x-2)(x-2)} \geq 0$
 $\Rightarrow III: (-\infty, 2) \cup (2, +\infty) \Rightarrow D_f: I \cap III: (-\infty, 1] \cup (2, +\infty)$

الف) $y = \sqrt{\frac{2x^2 - 5x + 3}{3x^2 - 4x + 2}} \geq 0$

$2x^2 - 5x + 3 \geq 0$
 $(a+b+c=0) \Rightarrow \begin{cases} x = \frac{3}{2} \\ x = 1 \end{cases}$ $\begin{array}{c|ccc} x & 1 & \frac{3}{2} & 2 \\ \hline & + & 0 & - \end{array}$ $(-\infty, 1] \cup [\frac{3}{2}, +\infty): I$

$3x^2 - 4x + 2 \geq 0$
 $(a+b+c=0) \Rightarrow \begin{cases} x = \frac{4}{3} \\ x = 1 \end{cases}$ $\begin{array}{c|ccc} x & 1 & \frac{4}{3} & 2 \\ \hline & + & 0 & - \end{array}$ $(-\infty, 1) \cup (\frac{4}{3}, +\infty): II$

$D_f: I \cap II: (-\infty, 1) \cup [\frac{4}{3}, +\infty)$

ب) $\sqrt{\frac{2x^2 - 5x + 3}{3x^2 - 4x + 2}} \geq 0$

$\begin{cases} x=1 \\ x=\frac{3}{2} \end{cases}, \begin{cases} x=\frac{4}{3} \\ x=2 \end{cases} \Rightarrow \begin{array}{c|ccc} x & 1 & \frac{4}{3} & \frac{3}{2} & 2 \\ \hline & + & 0 & - & + \end{array}$

$D_f: ((-\infty, \frac{4}{3}) - \{1\}) \cup [\frac{3}{2}, +\infty)$

$D_f: (-\infty, 1) \cup (1, \frac{4}{3}) \cup [\frac{3}{2}, +\infty)$

