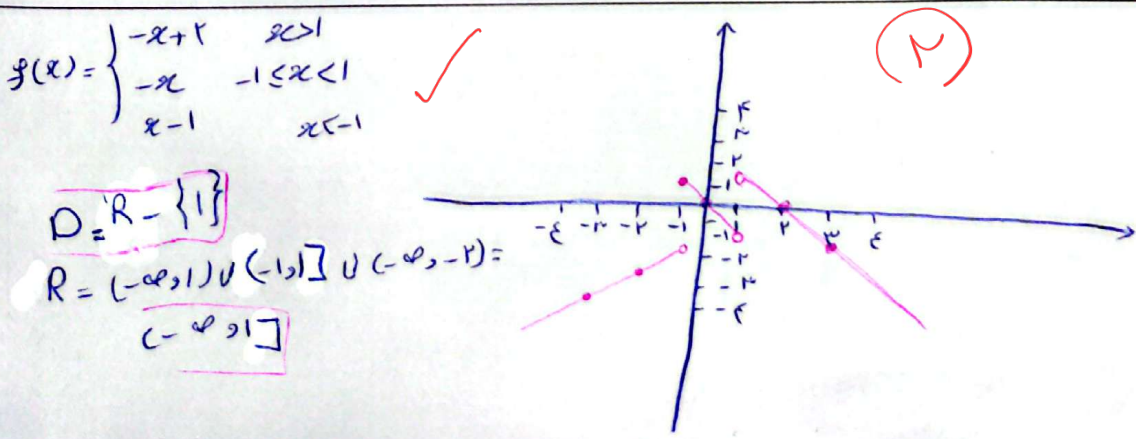


$A = \{1, 2, 3\}$
 $B = \{2, 3\}$
 $A \times B - B^2 = \emptyset$
 $A \times B = \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2), (3, 3)\}$
 $B^2 = B \times B = \{(2, 2), (2, 3), (3, 2), (3, 3)\}$
 $A \times B - B^2 = \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2), (3, 3)\} - \{(2, 2), (2, 3), (3, 2), (3, 3)\} =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

$f(x) = \{(x, m^2), (x, 1), (-x, m), (-x, -m), (x, m+1), (x, -1)\}$
 مولفه دوم یکسان $\rightarrow$ مولفه اول یکسان: شرط تابع
 $m^2 = m+1 \rightarrow m^2 - m - 1 = 0 \rightarrow (m+1)(m-2) = 0$
 $m = 2$ یا $m = -1$
 $m = 2 \Rightarrow f(x) = \{(x, 4), (x, 1), (-x, 2), (-x, -2), (x, 3), (x, -1)\}$
 $m = -1 \Rightarrow f(x) = \{(x, 1), (x, 1), (-x, -1), (-x, -1), (x, 0), (x, -1)\}$
 $f(x) = \{(x, m^2), (x, 1), (-x, m), (-x, -m), (x, m+1), (x, -1)\}$
 $m^2 = m+1 \rightarrow m = 2$ یا $m = -1$
 $f(x) = \{(x, 4), (x, 1), (-x, 2), (-x, -2), (x, 3), (x, -1)\}$
 $f(x) = \{(x, 1), (x, 1), (-x, -1), (-x, -1), (x, 0), (x, -1)\}$

$f(x) = \begin{cases} x^2 - 1 & x \leq 1 \\ ax + b & 1 \leq x \leq 2 \\ x^2 & x \geq 2 \end{cases}$
 $x = 1 \rightarrow f(1) = 1 - 1 = 0$
 $f(1) = a(1) + b = a + b$
 $a + b = 0 \rightarrow b = -a$
 $x = 2 \rightarrow f(2) = 4 + b \Rightarrow 4 + b = 1 \Rightarrow b = -3$
 $f(2) = 4 = 1$
 $a + b = 0 \rightarrow b = -a$
 $4 + b = 1 \Rightarrow b = -3$
 $a - 3 = 1 \Rightarrow a = 4$
 $a = 4, b = -3$
 $a \times b = -12$

$f(x) = \begin{cases} 2x - 3 & x \geq k \\ 4 - 3x & x \leq k \end{cases}$
 $2k - 3 = 4 - 3k$
 $5k = 7 \rightarrow k = \frac{7}{5} = 1.4$



$$x^2 + 2x + 1 = 0 \xrightarrow{x_1 = x_2} y_1 = y_2 \rightarrow 2y_1^2 = 2y_2^2 \rightarrow y_1^2 = y_2^2 \rightarrow y_1 = y_2 \checkmark$$

تابع هست

$$x^2 + 2y^2 - 12y + 10 = 0 \rightarrow (x^2 - 2x + 1) + (2y^2 - 12y + 9) = 0 \rightarrow (x-1)^2 + (2y-3)^2 = 0$$

$x=1, 2y=3 \rightarrow y=\frac{3}{2}$ $\left[\frac{1}{2}\right] \rightarrow$ در این نقطه تابع $\rightarrow$ تابع هست

$$x \sin y = y \sin x \xrightarrow{x=0} 0 \cdot \sin y = y \cdot \sin 0 \rightarrow 0 = 0 \checkmark$$

تابع نیست

$$\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \xrightarrow{\text{مربع کردن}} \frac{x}{y} + \frac{y}{x} + 2\sqrt{\frac{x}{y} \cdot \frac{y}{x}} = 4 \xrightarrow{\text{تکثیر در } xy} x^2 + y^2 + 2xy = 4xy \rightarrow x^2 + y^2 - 2xy = 0$$

$(x-y)^2 = 0 \rightarrow x=y \checkmark$ تابع هست - برای هر x یک y دارد

$$y = \sqrt{\frac{x-1}{x-3}} + \sqrt{\frac{x-2}{x}}$$

$\frac{x-1}{x-3} \geq 0 \rightarrow x \in (-\infty, 1] \cup (3, +\infty)$
 $\frac{x-2}{x} \geq 0 \rightarrow x \in (-\infty, 0] \cup [2, +\infty)$
 $\star \star \star = (-\infty, 1] \cup (3, +\infty) \cap (-\infty, 0] \cup [2, +\infty) = (-\infty, 1] \cup [2, +\infty)$

ب) $\sqrt{x} + \sqrt{y} - 1 = \sqrt{3} \rightarrow \sqrt{y} = \sqrt{3} - \sqrt{x} \rightarrow \sqrt{y} \geq 0 \rightarrow \sqrt{3} - \sqrt{x} \geq 0 \rightarrow \sqrt{x} \leq \sqrt{3} \rightarrow x \leq 3$

$\begin{cases} y-1 \geq 0 \rightarrow y \geq 1 \\ x=3 \rightarrow \sqrt{y}-1=0 \rightarrow y=1 \\ x=0 \rightarrow \sqrt{y}-1=\sqrt{3} \rightarrow y=4 \end{cases} \rightarrow 1 \leq y \leq 4$

$$y = \frac{\sqrt{x^2 - 2x + 4}}{\sqrt{x^2 - 10x + 14}}$$

$x^2 - 2x + 4 = 0 \rightarrow (x-1)(x-4) = 0 \rightarrow x=1, 4$
 $x^2 - 10x + 14 = 0 \rightarrow (x-2)(x-8) = 0 \rightarrow x=2, 8$

$-4x + 14 < 0 \rightarrow x < \frac{14}{4} = 3.5$

$\star \star \star = (-\infty, 1] \cup (4, +\infty) \cap (-\infty, 2) \cup (8, +\infty) = (-\infty, 1] \cup (4, 2) \cup (8, +\infty)$

ب) $y = \frac{\sqrt{x^2 - 2x + 4}}{\sqrt{x^2 - 10x + 14}}$

$\star \star \star = (-\infty, 1] \cup (4, 2) \cup (8, +\infty)$

$$y = \frac{\sqrt{2x^2 - 22x + 13}}{\sqrt{2x^2 - 22x + 13}}$$

$2x^2 - 22x + 13 = 0 \rightarrow x^2 - 11x + 6.5 = 0$
 $2x^2 - 22x + 13 = 0 \rightarrow x^2 - 11x + 6.5 = 0$

$\star \star \star = (-\infty, 1] \cup (2, \frac{11}{2}) \cup [\frac{11}{2}, +\infty)$