

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

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

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

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

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

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

$$m+2 = m^2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow m = \frac{1 \pm \sqrt{1+8}}{2} = \frac{1 \pm 3}{2} = \frac{1+3}{2} = 2 \text{ یا } \frac{1-3}{2} = -1$$

$$\Rightarrow f(m) = \{(2, 1), (-3, -1), (-2, -1), (2, 4)\}$$

ب) $g(n) = \{(n, 1), (n, 4), (-2, n), (-1, n)\}$

$$m^2 = m+2 \Rightarrow m = \frac{1 \pm \sqrt{1+8}}{2} = \frac{1 \pm 3}{2} = 2 \text{ یا } -1$$

این زوج مرتب به ازای هیچ یک از مقادیر m موجود نیست!

$$f(x) = \begin{cases} x^2 - 1 & ; x \leq 1 \\ ax + b & ; 1 < x \leq 2 \\ x^3 & ; x > 2 \end{cases}$$

$$f(1) = \begin{cases} 1 - 1 = 0 \\ a + b = 0 \end{cases}$$

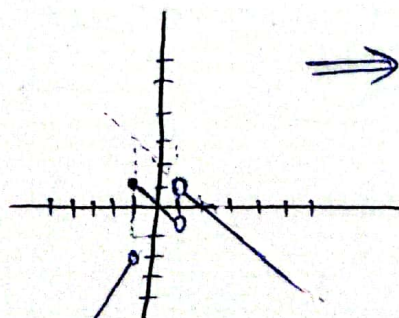
$$f(2) = \begin{cases} 2a + b = 8 \end{cases}$$

$$\begin{cases} a + b = 0 \\ 2a + b = 8 \end{cases} \Rightarrow \begin{cases} a = 8 \\ b = -8 \end{cases}$$

$$a \times b = ? \Rightarrow a \times b = (8) \times (-8) = -64$$

$$f(x) = \begin{cases} 2x - 3 & ; x > k \\ 4 - 3x & ; x \leq k \end{cases} \Rightarrow f(k) = \begin{cases} 2k - 3 \\ 4 - 3k \end{cases} \Rightarrow 2k - 3 = 4 - 3k \Rightarrow 5k = 7 \Rightarrow k = \frac{7}{5}$$

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



$$\Rightarrow \begin{cases} D_f = (-\infty, +\infty) - \{1\} \\ R_f = (-\infty, +1] \end{cases}$$

$$x^2 - 10x + 14 = 0 \rightarrow 9x = 14 \rightarrow x = \frac{14}{9}$$

الف) $xy^3 + x^2 + 1 = 0$ اشتباه $\begin{cases} xy^3 + x^2 + 1 = 0 \\ xy^3 + x^2 + 1 = 0 \end{cases} \rightarrow \begin{cases} xy^3 = -x^2 - 1 \\ xy^3 = -x^2 - 1 \end{cases} \rightarrow xy^3 = xy^3 \rightarrow y^3 = y^3 \rightarrow y_1 = y_2$
 $\Rightarrow y_1 = \sqrt[3]{y_2} \rightarrow y_1 = y_2$ * این عبارت تابع است! *
 ب) $x^2 + 4y^2 - 2x - 12y + 10 = 0$ $\rightarrow (x^2 - 2x + 1) + (4y^2 - 12y + 9) = 0$
 $\Rightarrow (x-1)^2 + (2y-3)^2 = 0 \rightarrow \begin{cases} x-1=0 \rightarrow x=1 \\ 2y-3=0 \rightarrow y=\frac{3}{2} \end{cases}$ این عبارت تابع است

الف) $x \sin y = y \sin x$ مثال نقض $x=0 \Rightarrow 0 \times \sin y = y \times \sin 0 \Rightarrow 0 = 0 \times y$
 $\Rightarrow \begin{cases} x=0 \\ y \text{ هر مقاری می تواند باشد} \end{cases}$ این عبارت تابع نیست
 ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2$ یک نقطه $\rightarrow \frac{x}{y} = 1 \rightarrow \begin{cases} x=1 \\ y=1 \end{cases}$ نقطه

الف) $y = \sqrt{\frac{x-1}{x-3}} + \sqrt{\frac{2-x}{x}}$ دامنه را بدینکار $\begin{cases} \text{I} \begin{cases} \frac{x-1}{x-3} \geq 0 \\ x-3 \neq 0 \end{cases} \rightarrow \frac{1}{x-3} \geq 0 \\ \text{II} \begin{cases} \frac{2-x}{x} \geq 0 \\ x \neq 0 \end{cases} \rightarrow \frac{0}{x} \geq 0 \end{cases}$
 $\Rightarrow D_f = (0, 1]$
 ب) $\sqrt{x} + \sqrt{y-1} = \sqrt{3}$ $\Rightarrow \sqrt{y-1} = \sqrt{3} - \sqrt{x} \rightarrow \sqrt{3} - \sqrt{x} \geq 0 \Rightarrow \sqrt{x} \leq \sqrt{3} \Rightarrow x \leq 3$
 $\Rightarrow y = (\sqrt{3} - \sqrt{x})^2 + 1 \Rightarrow (\sqrt{3} - 0)^2 + 1 = 4 \Rightarrow (\sqrt{3} - \sqrt{3})^2 + 1 = 1$
 $\Rightarrow D_f = [0, 3]$

الف) $y = \frac{x^2 - 7x + 4}{\sqrt{x^2 - 10x + 14}}$ $\rightarrow y = \frac{(x-1)(x-4)}{\sqrt{(x+2)(x-1)}}$ $\begin{cases} \text{I} \frac{1}{x-3} \geq 0 \\ \text{II} \frac{2}{x-1} \geq 0 \end{cases}$
 $\Rightarrow D_f = (-\infty, 1] \cup (4, +\infty)$
 ب) $y = \frac{x^2 - 7x + 4}{\sqrt{x^2 - 10x + 14}}$ $\Rightarrow \frac{x^2 - 7x + 4}{x^2 - 10x + 14} \geq 0 \Rightarrow \frac{(x-1)(x-4)}{(x-2)(x-1)} \geq 0$
 $\Rightarrow D_y = (-\infty, 1] \cup (2, 4] \cup (11, +\infty)$

الف) $y = \sqrt{2x^2 - 5x + 3}$ $\begin{cases} \text{I} 2x^2 - 5x + 3 \geq 0 \rightarrow x = \frac{5 \pm \sqrt{25-24}}{4} \rightarrow \begin{cases} x=1 \\ x=\frac{3}{2} \end{cases} \\ \text{II} 2x^2 - 7x + 4 \geq 0 \rightarrow x = \frac{7 \pm \sqrt{49-32}}{4} \rightarrow \begin{cases} x=\frac{7}{4} \\ x=2 \end{cases} \end{cases}$
 $\Rightarrow D_f = (-\infty, 1] \cup [\frac{7}{4}, 2] \cup [\frac{3}{2}, +\infty)$
 ب) $y = \sqrt{2x^2 - 5x + 3}$ $\Rightarrow \frac{2x^2 - 5x + 3}{2x^2 - 7x + 4} \geq 0$ $\Rightarrow \frac{2x^2 - 5x + 3}{2x^2 - 7x + 4}$
 $\Rightarrow D_f = (-\infty, 1] \cup (\frac{7}{4}, 2] \cup [\frac{3}{2}, +\infty)$

$\Rightarrow D_f = (-\infty, 1] \cup (\frac{7}{4}, 2] \cup [\frac{3}{2}, +\infty)$