

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

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

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

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

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

$$f(m) = \left\{ \left(\frac{m}{2}, 1 \right), \left(-\frac{m}{2}, 1 \right), \left(\frac{m}{2}, 2 \right), \left(-\frac{m}{2}, 2 \right), \left(\frac{m}{2}, 4 \right), \left(-\frac{m}{2}, 4 \right) \right\}$$

$$m+2 = m^2 \rightarrow m^2 - m - 2 = 0 \rightarrow m = \frac{1 \pm \sqrt{1+8}}{2} = \frac{1 \pm 3}{2} = \frac{1 \pm 3}{2} \begin{cases} 2 \rightarrow \text{غرض} \rightarrow (2, 1), (2, 4) \times \\ -1 \rightarrow \checkmark \end{cases}$$

$$\Rightarrow f(m) = \left\{ (2, 1), (2, 1), (-2, -1), (-2, -1), (3, 1), (-1, 4) \right\} \rightarrow \text{به ازای } m = -1 \text{ تابع است!}$$

$$g(n) = \left\{ \left(\frac{n}{2}, 1 \right), \left(\frac{n}{2}, 2 \right), \left(\frac{n}{2}, 4 \right), \left(-\frac{n}{2}, 1 \right), \left(-\frac{n}{2}, 2 \right), \left(-\frac{n}{2}, 4 \right) \right\}$$

$$m^2 = m+2 \rightarrow m = \frac{1 \pm \sqrt{1+8}}{2} = \frac{1 \pm 3}{2} \begin{cases} 2 \rightarrow \text{غرض} \rightarrow (2, 1), (2, 4) \times \\ -1 \rightarrow \text{غرض} \rightarrow (-1, 3), (-1, 4) \times \end{cases}$$

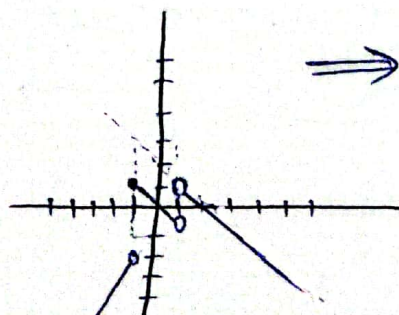
این زوج مرتب به ازای هیچ یک از مقادیر تابع نیست!

$$f(x) = \begin{cases} x^2 - 1 & ; x \leq 1 \\ ax + b & ; 1 < x \leq 2 \\ x^3 & ; x > 2 \end{cases} \rightarrow f(1) \rightarrow \begin{cases} 1 - 1 = 0 \\ a + b = 0 \end{cases} \Rightarrow \begin{cases} a + b = 0 \\ 2a + b = 1 \end{cases} \Rightarrow \begin{cases} a = 1 \\ b = -1 \end{cases}$$

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

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

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



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

من این سوال را در نظر گرفتن چون به نظر اشتباه ناپدید بود اما اگر $x^2 - 10x + 14 = 0 \rightarrow 9x + 14 = 0 \rightarrow 9x = -14 \rightarrow x = -\frac{14}{9}$ سوال ۹

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

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

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

الف) $y = \frac{\sqrt{2x^2 - 5x + 3}}{\sqrt{3x^2 - 7x + 4}}$ رادیکال $\begin{cases} \text{I} 2x^2 - 5x + 3 \rightarrow x = \frac{5 \pm \sqrt{25 - 24}}{4} \rightarrow \begin{cases} x=1 \\ x=\frac{3}{2} \end{cases} \\ \text{II} 3x^2 - 7x + 4 \rightarrow x = \frac{7 \pm \sqrt{49 - 48}}{6} \rightarrow \begin{cases} x=\frac{1}{3} \\ x=4 \end{cases} \end{cases}$ نقطه $\Rightarrow D_f = (-\infty, 1] \cup (\frac{1}{3}, \frac{3}{2}) \cup (\frac{3}{2}, 4] \cup (4, +\infty)$
 ب) $y = \frac{\sqrt{2x^2 - 5x + 3}}{\sqrt{3x^2 - 7x + 4}}$ رادیکال $\begin{cases} \frac{2x^2 - 5x + 3}{3x^2 - 7x + 4} \geq 0 \rightarrow \frac{2x^2 - 5x + 3}{3x^2 - 7x + 4} \geq 0 \rightarrow \begin{cases} x=1 \\ x=\frac{3}{2} \\ x=\frac{1}{3} \\ x=4 \end{cases}$ نقطه $\Rightarrow D_f = (-\infty, 1] \cup (\frac{1}{3}, \frac{3}{2}) \cup (\frac{3}{2}, 4] \cup (4, +\infty)$

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