

(1) $A = \{1, 2, 3\}, B = \{2, 3\}$ $\xrightarrow[\text{مک}]{\text{ظنیت}} A \times B = B^2$

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

$\Rightarrow A \times B - B^2 = \{(1, 2), (1, 3)\}$ ← حاصل عبارت ✓

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

$m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow m = -1$ و $m = 2$ ✓
 تحقق به آن m برابر 2 و -1 است که در این دو مورد هم و در این دو مورد هم

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

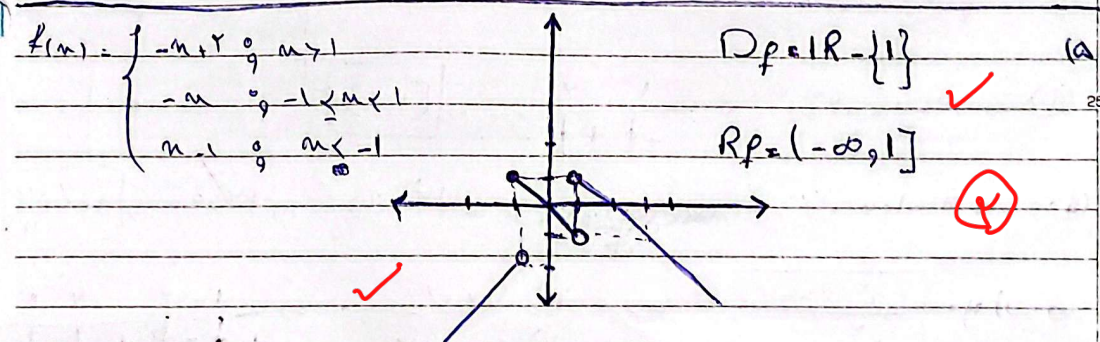
$m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow m = -1$ و $m = 2$ ✓
 در این دو مورد هم و در این دو مورد هم

$f(m) = \begin{cases} x^2 - 1 & : m \leq 1 \\ am + b & : 1 < m \leq 2 \\ x^3 & : m > 2 \end{cases} \Rightarrow \begin{cases} x^2 - 1 = am + b \\ x^3 = am + b \end{cases} \Rightarrow x^2 - 1 = x^3$ (3)

$m = 1 \rightarrow a + b = 0 \rightarrow a = -b$ *

$m = 2 \rightarrow 2a + b = 1 \rightarrow b = -1$ و $a = 1$

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



(الف) $2y^3 + x^2 + 1 = 0 \rightarrow 2y^3 = -x^2 - 1 \rightarrow y^3 = \frac{-x^2 - 1}{2} = -\frac{x^2 + 1}{2}$ (14)

$\begin{cases} y_1^3 = -\frac{x^2 + 1}{2} \\ y_2^3 = -\frac{x^2 + 1}{2} \end{cases} \Rightarrow y_1^3 = y_2^3 \Rightarrow y_1 = y_2 \rightarrow$ عبارت تابع نیست ✓

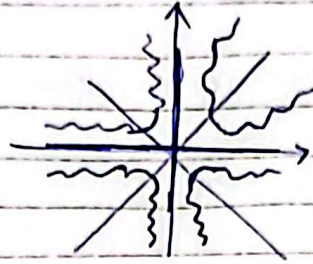
(ب) $x^2 + 4y^2 - 2x - 12y + 10 = 0 \Rightarrow 4y^2 - 12y = -x^2 + 2x - 10$

امتحان $x = 1 \Rightarrow 4y^2 - 12y = -1 + 2 - 10 = -9 \Rightarrow 4y^2 - 12y + 9 = 0 \Rightarrow (2y - 3)^2 = 0 \Rightarrow y = \frac{3}{2}$

عبارت یک تابع نیست ← زیرا در این دو مورد هم و در این دو مورد هم $\Rightarrow y_1 = y_2 = \frac{3}{2}$ عبارت یک تابع نیست (15)

امتحان ریاضیات
 (۷) عبارت تابع است $\Rightarrow x=3$ $\Rightarrow y = y \times \frac{1}{x}$ $\Rightarrow x \sin y = y \sin x$ (الف)

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



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

$\Rightarrow y=1$ $\Rightarrow$ عبارت تابع هست $n=y$

(۸) $y = \sqrt{\frac{x-1}{x-2}} + \sqrt{\frac{x-2}{x-1}}$

$\frac{x-1}{x-2} \geq 0 \Rightarrow \frac{1}{x-2} \geq 0 \Rightarrow D_f = (-\infty, 1) \cup (2, +\infty)$
 $\Rightarrow D_f = \{1\}$ $\leftarrow \text{I} \cap \text{II}$

$D = (0, 1] \cup [2, +\infty)$

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

$\Rightarrow D_f = [0, +\infty)$

$\sqrt{3} - \sqrt{y-1} \geq 0 \Rightarrow y \leq 3$

$D = [0, 3]$

الف) $y = \frac{\sqrt{x^2 - 5x + 4}}{\sqrt{x^2 - 10x + 14}}$

$D_f = [1, 14]$

$(1, +\infty)$

(I) $\rightarrow x^2 - 5x + 4 \geq 0 \Rightarrow \frac{1}{x-4} + \frac{1}{x-1} \geq 0 \Rightarrow [1, 4]$

(II) $\rightarrow x^2 - 10x + 14 \geq 0 \Rightarrow 14 - 4x \geq 0 \Rightarrow 14 \geq 4x \Rightarrow x \leq \frac{14}{4}$

ب) $y = \frac{\sqrt{x^2 - 5x + 4}}{\sqrt{x^2 - 10x + 14}} \Rightarrow \frac{x^2 - 5x + 4}{x^2 - 10x + 14} \geq 0 \Rightarrow \frac{1}{x-4} + \frac{1}{x-1} + \frac{1}{x-2} + \frac{1}{x-7} \geq 0$

$\Rightarrow D_f = (-\infty, 1] \cup (2, 4] \cup (7, +\infty)$

الف) $y = \frac{\sqrt{2x^2 - 5x + 3}}{\sqrt{3x^2 - 7x + 4}} \Rightarrow \begin{cases} 2x^2 - 5x + 3 \geq 0 \Rightarrow \frac{1}{x-3} + \frac{1}{x-1} \geq 0 \Rightarrow (-\infty, 1] \cup [3, +\infty) \\ 3x^2 - 7x + 4 \geq 0 \Rightarrow \frac{1}{x-4} + \frac{1}{x-1} \geq 0 \Rightarrow (-\infty, 1) \cup (\frac{4}{3}, +\infty) \end{cases}$

ب) $y = \frac{\sqrt{2x^2 - 5x + 3}}{\sqrt{3x^2 - 7x + 4}} \Rightarrow \frac{2x^2 - 5x + 3}{3x^2 - 7x + 4} \geq 0 \Rightarrow D_f = (-\infty, 1) \cup [\frac{4}{3}, +\infty)$

$\Rightarrow \frac{1}{x-4} + \frac{1}{x-1} - \frac{1}{x-2} \geq 0 \Rightarrow D_f = (-\infty, \frac{4}{3}) \cup [\frac{4}{3}, +\infty) - \{1\}$