

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

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

$$= \{(1, 2), (1, 3)\}$$

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

$$\Rightarrow (3, m^2) \text{ و } (3, m+2) \Rightarrow m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \quad (m-2)(m+1) = 0$$

غیر متقارن $m=2$
متقارن $m=-1$

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

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

غیر متقارن $m=2$
غیر متقارن $m=-1$

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

(I) $x^2 - 1 = ax + b \xrightarrow{x=1} a + b = 0 \quad \boxed{a = -b}$

(II) $x^3 = ax + b \xrightarrow{x=2} 8 = 2a + b \quad \begin{cases} 2a + b = 8 \\ -b = 8 \end{cases} \Rightarrow \begin{cases} a = +4 \\ b = -8 \end{cases}$

$$\Rightarrow a \times b = 4 \times -8 = -32$$

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

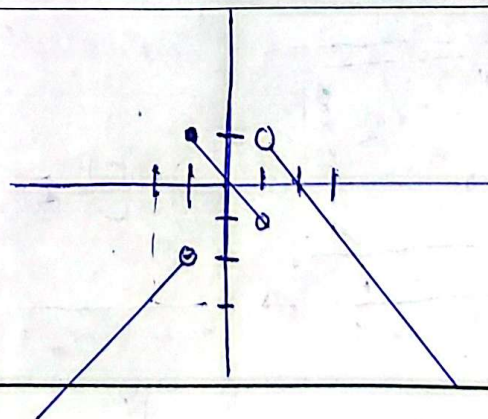
$$x^2 - 3 = 4 - 3x \xrightarrow{x=k} k^2 - 3 = 4 - 3k \quad \Delta k = 0$$

$$\Rightarrow k = \frac{7}{2} = 3.5$$

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

$$D_f = (-\infty, +1) \cup (+1, +\infty)$$

$$R_f = (-\infty, 1]$$



الف) $|y|^3 + |x| + 1 = 0 \rightarrow |y|^3 = -|x| - 1$ $|y|^3 = |y|^3 \Rightarrow y = y_1$ تابع است

ب) $x^2 + |y|^2 - 2x - 1|y| + 10 = 0 \rightarrow x^2 - 2x + 1 + |y|^2 - |y| + 9 = (x-1)^2 + (|y|-\frac{1}{2})^2 = 0$
 $\Rightarrow \begin{cases} x=1 \\ y=\frac{1}{2} \end{cases}$ فقط در این نقطه متعلق می باشد

الف) $x \sin y = y \sin x \xrightarrow{x=0} y = \mathbb{R} \Rightarrow$ اگر x صفر باشد y هر عددی می تواند باشد پس تابع نیست

ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \Rightarrow \begin{cases} x=1 \\ y=1 \end{cases}$ فقط در این نقطه متعلق می باشد

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

$\Rightarrow D_f = (0, 1]$
 ب) $\sqrt{x} + \sqrt{y-1} = \sqrt{3} \rightarrow (\sqrt{y-1})^2 = (\sqrt{3}-\sqrt{x})^2 \rightarrow y \geq 1 \rightarrow \sqrt{3}-\sqrt{x} \geq 0 \rightarrow \sqrt{3} \geq \sqrt{x} \rightarrow x \leq 3$
 $\Rightarrow D_f = [0, 3]$ چون $\sqrt{y-1}$ از منفی بزرگتر و معنای است پس $\sqrt{3}-\sqrt{x}$ بیشتر است

الف) $y = \frac{\sqrt{x^2-7x+6}}{\sqrt{x-10x+16}} \Rightarrow \begin{cases} x^2-7x+6 \geq 0 \rightarrow (x-1)(x-6) \geq 0 \rightarrow \frac{1}{1+\phi-1+\phi} \rightarrow (-\infty, 1] \cup [6, +\infty) \text{ (I)} \\ x-10x+16 \geq 0 \rightarrow x \leq \frac{16}{9} \text{ (II)} \end{cases}$

$(I) \cap (II) \rightarrow D_f = (-\infty, 1] \cup [6, \frac{16}{9}]$
 ب) $y = \sqrt{\frac{x^2-7x+6}{x^2-10x+16}} \rightarrow \frac{(x-1)(x-6)}{(x-2)(x-8)} \geq 0 \rightarrow \frac{1}{1+\phi-\phi+\phi-\phi} \rightarrow D_f = (-\infty, 1] \cup (2, 6] \cup (8, +\infty)$

الف) $y = \frac{\sqrt{2x^2-5x+3}}{\sqrt{3x^2-7x+4}} \rightarrow \begin{cases} 2x^2-5x+3 \geq 0 \rightarrow (2x-1)(x-3) \geq 0 \rightarrow \frac{1}{1+\phi-\phi+\phi-\phi} \text{ (I)} \\ 3x^2-7x+4 \geq 0 \rightarrow (3x-4)(x-1) \geq 0 \rightarrow \frac{1}{1+\phi-\phi+\phi-\phi} \text{ (II)} \end{cases}$

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