

الف) $4x^2 - 5x - 9 = 0 \Rightarrow x^2 - 5x + 9 = 0 \Rightarrow (x-9)(x+4) = 0 \Rightarrow \begin{cases} x = \frac{9}{4} = \frac{3}{4} \\ x = -\frac{4}{4} = -1 \end{cases}$

ب) $3x^2 - 11x - 3 = 0 \Rightarrow x^2 - 11x - 9 = 0 \Rightarrow (x-9)(x+1) = 0 \Rightarrow \begin{cases} x = \frac{9}{1} = 9 \\ x = -\frac{1}{1} = -1 \end{cases}$

ج) $4x^2 - 14x - 3 = 0 \Rightarrow x^2 - 14x - 12 = 0 \Rightarrow (x-9)(x+4) = 0 \Rightarrow \begin{cases} x = \frac{9}{1} = 9 \\ x = -\frac{4}{1} = -4 \end{cases}$

د) $2x^2 - 5x - 12 = 0 \Rightarrow x^2 - 5x - 12 = 0 \Rightarrow (x-1)(x+3) = 0 \Rightarrow \begin{cases} x = \frac{1}{1} = 1 \\ x = -\frac{3}{1} = -3 \end{cases}$

الف) $x^2 - 5x - 12 = 0 \Rightarrow (x-1)(x+3) = 0 \Rightarrow \begin{cases} x = 1 \\ x = -3 \end{cases}$

ب) $2x^2 + 5x + 3 = 0 \Rightarrow x^2 + 5x + 6 = 0 \Rightarrow (x+3)(x+2) = 0 \Rightarrow \begin{cases} x = -\frac{3}{1} = -3 \\ x = -\frac{2}{1} = -2 \end{cases}$

ج) $x^2 + 2x + 3 = 0 \Rightarrow \Delta = b^2 - 4ac = 4 - 12 = -8 \rightarrow$ معادله ریشه ندارد

د) $3x^2 + 3x - 4 = 0 \Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-3 \pm \sqrt{9 + 48}}{6} = \frac{-3 \pm \sqrt{57}}{6}$

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

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

$m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow (m-2)(m+1) = 0 \Rightarrow \begin{cases} m = -1 \\ m = 2 \end{cases}$

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

$m^2 = m+4 \Rightarrow m^2 - m - 4 = 0 \Rightarrow (m-2)(m+1) = 0 \Rightarrow \begin{cases} m = -1 \rightarrow (-1, 3) \neq (-1, 4) \times \\ m = 2 \rightarrow (2, 1) \neq (2, 4) \times \end{cases} \rightarrow m \text{ مقدر}$

$f(x) = \{(1, a^2), (1, 3a-2), (a^2, 3a+2)\} \quad a^2 = 3a-2 \Rightarrow a^2 - 3a + 2 = 0 \Rightarrow (a-1)(a-2) = 0 \Rightarrow \begin{cases} a = 1 \\ a = 2 \end{cases}$
 $3a = 1 \Rightarrow (1, 1) \neq (1, 6) \times$

$f(x) = \begin{cases} x^2 - 1 & x \leq 1 \\ ax + b & 1 < x \leq 2 \\ x^3 & x > 2 \end{cases} \rightarrow \begin{cases} x = 1 \rightarrow 1 - 1 = a + b \Rightarrow a + b = 0 \\ x = 2 \rightarrow 2^3 = 2a + b \Rightarrow 2a + b = 8 \end{cases} \rightarrow \begin{cases} a = 1 \\ b = -1 \end{cases} \Rightarrow \underline{ab = -1}$

$$f(x) = \begin{cases} 2x-3 & x \geq k \\ 3-2x & x \leq k \end{cases} \rightarrow x=k \Rightarrow 2k-3 = 3-2k \Rightarrow 4k=6 \Rightarrow k=\frac{3}{2}$$

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تابع نیست $y^3 - 4y = x^2 - 2x + 3 \Rightarrow x=1 \rightarrow y^3 - 4y = 1 - 2 + 3 = 2 \Rightarrow y(y^2 - 4) = 2 \Rightarrow y=0, \pm\sqrt{4}$

تابع نیست $|x| + |y| = 3, x=0 \Rightarrow |y| = 3 \Rightarrow y = \pm 3$

تابع نیست $|y| = \sqrt{1 - \cos x}, \cos x = \frac{1}{2} \Rightarrow |y| = \sqrt{1 - \frac{1}{2}} \Rightarrow y = \pm \sqrt{\frac{1}{2}}$

تابع هست $y^2 + x^2 + 2x + 1 = 0 \Rightarrow y^2 + (x+1)^2 = 0$



تابع هست $\sqrt{y} + x^2 = 2x - 2 \Rightarrow \sqrt{y} = -x^2 + 2x - 2$
 $\begin{cases} \sqrt{y_1} = -x^2 + 2x - 2 \\ \sqrt{y_2} = -x^2 + 2x - 2 \end{cases} \Rightarrow \sqrt{y_1} = \sqrt{y_2} \Rightarrow y_1 = y_2$

$y^3 + 2y = 5x \Rightarrow \begin{cases} y_1^3 + 2y_1 = 5x \\ y_2^3 + 2y_2 = 5x \end{cases} \Rightarrow y_1^3 + 2y_1 = y_2^3 + 2y_2 \Rightarrow (y_1^3 - y_2^3) + 2(y_1 - y_2) = 0 \Rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2) = 0$

$\Rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2) = 0$
 $\rightarrow y_1 - y_2 = 0 \Rightarrow y_1 = y_2$
 $\rightarrow y_1^2 + y_1y_2 + y_2^2 + 2 = 0 \Rightarrow \Delta = b^2 - 4ac = y_1^2 - 4y_1^2 - 4 = -3y_1^2 - 4 < 0$
 (ریشه ندارد) تابع است

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الف) $x \sin y = y \sin x \rightarrow x = 2\pi \Rightarrow 2\pi \sin y = y \sin 2\pi \Rightarrow 2\pi \sin y = 0$

تابع نیست $\rightarrow$ بی‌شمار از یک مقدار $\rightarrow y = k\pi \Rightarrow \sin y = 0 \Rightarrow y = k\pi$

ب) $\left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2\right)^2 \Rightarrow \frac{x}{y} + \frac{y}{x} + 2\sqrt{\frac{xy}{yx}} = 4 \Rightarrow \frac{x}{y} + \frac{y}{x} = 2 \Rightarrow$

$\frac{x^2 + y^2}{xy} = 2 \Rightarrow x^2 + y^2 = 2xy \Rightarrow x^2 + y^2 - 2xy = 0 \Rightarrow (x - y)^2 = 0 \Rightarrow x = y$
 $\rightarrow x, y \neq 0$
 تابع است

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