

الف) $4x^2 - 5x - 4 = 0 \Rightarrow x^2 - 5x - 4 = 0 \Rightarrow (x - \frac{5}{4})(x + \frac{4}{4}) = 0 \Rightarrow (x - \frac{5}{4})(x + 1) = 0 \Rightarrow x = \begin{cases} \frac{5}{4} \\ -1 \end{cases}$
 ب) $3x^2 - 11x - 2 = 0 \Rightarrow x^2 - 11x - 2 = 0 \Rightarrow (x - 9)(x + 1) = 0 \Rightarrow (x - \frac{9}{4})(x + \frac{1}{4}) = 0 \Rightarrow x = \begin{cases} \frac{9}{4} \\ -\frac{1}{4} \end{cases}$
 ج) $4x^2 - 5x - 2 = 0 \Rightarrow x^2 - 5x - 2 = 0 \Rightarrow (x - 4)(x + 2) = 0 \Rightarrow (x - \frac{4}{4})(x + \frac{2}{4}) = 0 \Rightarrow (x - 1)(x + \frac{1}{2}) = 0 \Rightarrow x = \begin{cases} 1 \\ -\frac{1}{2} \end{cases}$
 د) $2x^2 - 5x - 12 = 0 \Rightarrow x^2 - 5x - 12 = 0 \Rightarrow (x - 8)(x + 4) = 0 \Rightarrow (x - \frac{8}{4})(x + \frac{4}{4}) = 0 \Rightarrow (x - 2)(x + 1) = 0 \Rightarrow x = \begin{cases} 2 \\ -1 \end{cases}$

الف) $x^2 - 2x - 12 = 0 \Rightarrow (x - 6)(x + 2) = 0 \Rightarrow x = \begin{cases} 6 \\ -2 \end{cases}$
 ب) $2x^2 + 5x + 3 = 0 \Rightarrow x^2 + 5x + 4 = 0 \Rightarrow (x + 2)(x + 3) = 0 \Rightarrow (x + 1)(x + \frac{3}{4}) = 0 \Rightarrow x = \begin{cases} -1 \\ -\frac{3}{4} \end{cases}$
 ج) $x^2 + 2x + 3 = 0 \Rightarrow \Delta = b^2 - 4ac \Rightarrow 4 - 12 = -8 \Rightarrow \Delta < 0$
 د) $2x^2 + 3x - 2 = 0 \Rightarrow \Delta = 9 + 16 = 25 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-3 \pm \sqrt{25}}{4} = \begin{cases} \frac{-3 + 5}{4} \\ \frac{-3 - 5}{4} \end{cases} = \begin{cases} \frac{2}{4} \\ -\frac{8}{4} \end{cases} = \begin{cases} \frac{1}{2} \\ -2 \end{cases}$

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

الف) $f(x) = \{(2, m^2), (2, 1), (-2, m), (-2, m), (3, m+2), (m, 4)\}$ $m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow (m-2)(m+1) = 0 \Rightarrow m = 2 \Rightarrow \{(2, 1), (2, 4)\} \times m = -1 \Rightarrow \{(2, 4), (2, 1), (-2, -1), (-2, -1), (3, 1), (-1, 4)\}$
 ب) $g(x) = \{(2, m^2), (2, 1), (m, 4), (3, m+2), (-2, m), (-1, 3)\}$ $m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow (m-2)(m+1) = 0 \Rightarrow m = 2 \Rightarrow \{(2, 1), (2, 4)\} \times m = -1 \Rightarrow \{(3, 1), (3, 1), (-1, 4), (3, 1), (-2, -1), (-1, 3)\} \times$

$f(x) = \{(1, a^2), (1, 3a-2), (a^2, 3a+2)\}$ $a = 1 \Rightarrow \{(1, 1), (1, 1), (1, 4)\} \times$
 $a^2 = 3a-2$
 $a^2 - 3a + 2 = 0$
 $(a-2)(a-1) = 0$
 $a = 2 \Rightarrow \{(1, 4), (1, 4), (4, 8)\}$

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

$$x=1 \Rightarrow 1-1 = a+b \Rightarrow a+b=0 \Rightarrow \underline{a=-b}$$

$$x=2 \Rightarrow 2a+b=1 \Rightarrow -2b+b=1 \Rightarrow \underline{b=-1} \Rightarrow \underline{a=1}$$

$$a+b=-2 \quad \text{پ}$$

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

$$x=k \Rightarrow 2k-3 = 4-3k$$

$$5k=7$$

$$k = \frac{7}{5}$$

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

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

ج) $|y| = \sqrt{1 - \cos x} \Rightarrow x = 180^\circ \Rightarrow \cos 180^\circ = -1 \Rightarrow |y| = \sqrt{1 - (-1)} \Rightarrow |y| = \sqrt{2} \Rightarrow y = \pm \sqrt{2}$ تابع نیست

د) $y^2 + x^2 + 2x + 1 = 0 \Rightarrow y^2 + (x+1)^2 = 0 \Rightarrow y=0, x=-1 \Rightarrow \left| \begin{smallmatrix} 1 & 0 \\ 0 & 1 \end{smallmatrix} \right| \neq 0$ تابع هست پ

ه) $\sqrt[3]{y} + x^2 = 2x - 2 \Rightarrow \sqrt[3]{y_1} = -x_1^2 + 2x_1 - 2 \Rightarrow \sqrt[3]{y_1} = \sqrt[3]{y_2} \Rightarrow y_1 = y_2$ تابع هست

و) $y^3 + 2y = 2x \Rightarrow y_1^3 + 2y_1 = 2x \Rightarrow y_1^3 + 2y_1 = y_2^3 + 2y_2 \Rightarrow y_1^3 - y_2^3 = 2(y_2 - y_1) \Rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2) = 0$ تابع هست پ

ز) $x \sin y = y \sin x \Rightarrow x = \pi \Rightarrow \pi \sin y = y \sin \pi \Rightarrow \sin y = 0 \Rightarrow y = \pi, 2\pi$ تابع نیست

ح) $\sqrt{x} + \sqrt{y} = 2 \Rightarrow \frac{x}{y} + \frac{y}{x} + 2 = 2 \Rightarrow \frac{x^2 + y^2}{xy} = 0 \Rightarrow x^2 + y^2 = 2xy \Rightarrow x^2 - 2xy + y^2 = 0 \Rightarrow (x-y)^2 = 0 \Rightarrow x=y$ تابع هست پ

$$(10-ب) \quad \sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2$$

این عبارت تنها زمانی برقرار است که $\sqrt{\frac{x}{y}} = 1$ باشد پس

$$\sqrt{\frac{x}{y}} = 1 \leadsto \frac{x}{y} = 1 \leadsto x = y \quad (x, y \neq 0)$$

