

الف) $4x^2 - 5x - 4 = 0 \rightarrow x^2 - 5x - 24 = 0 \rightarrow (x+4)(x-9) \begin{cases} x = -\frac{4}{1} = -4 \\ x = \frac{9}{1} = 9 \end{cases}$

ب) $x^2 - 18x - 9 = 0 \rightarrow x^2 - 18x - 9 = 0 \rightarrow (x+1)(x-9) \begin{cases} x = -\frac{1}{1} = -1 \\ x = \frac{9}{1} = 9 \end{cases}$

ج) $4x^2 - 4x - 2 = 0 \rightarrow x^2 - x - 1 = 0 \rightarrow (x+2)(x-4) \begin{cases} x = -\frac{2}{1} = -2 \\ x = \frac{4}{1} = 4 \end{cases}$

د) $2x^2 - 5x - 12 = 0 \rightarrow x^2 - 5x - 12 = 0 \rightarrow (x+4)(x-8) \begin{cases} x = -\frac{4}{1} = -4 \\ x = \frac{8}{1} = 8 \end{cases}$

الف) $x^2 - 5x - 14 = 0 \rightarrow \Delta = 25 + 56 = 81 \rightarrow x = \frac{5 \pm \sqrt{81}}{2} \begin{cases} 7 \\ -2 \end{cases}$

ب) $2x^2 + 5x + 2 = 0 \rightarrow x^2 + 5x + 4 = 0 \rightarrow (x+2)(x+4) \begin{cases} x = -\frac{2}{1} = -2 \\ x = -\frac{4}{1} = -4 \end{cases}$

ج) $x^2 + 2x + 2 = 0 \rightarrow \Delta = 4 - 8 = -4 \rightarrow \text{ریشه حقیقی ندارد}$

د) $12x^2 + 13x - 2 = 0 \rightarrow \Delta = 169 + 96 = 265 \rightarrow x = \frac{-13 \pm \sqrt{265}}{24}$

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

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

با توجه به زوج مرتب اول و پنجم تابع f $m^T = m + 2$

$f(x) = \{(1,1), (1,2), (-1,1), (-1,2), (1,3), (1,4)\}$ $m^T - m - 2 = 0 \begin{cases} m = 2 \times \\ m = -1 \checkmark \end{cases}$

با توجه به زوج مرتب اول و چهارم تابع g $m^T = m + 2$

$g(x) = \{(1,1), (1,2), (-1,2), (1,3), (-1,3), (-1,4)\}$ $m^T - m - 2 = 0 \begin{cases} m = 2 \times \\ m = -1 \checkmark \end{cases}$

$f(x) = \{(1, a^2), (1, 2a-2), (a^2, 2a+2)\} \rightarrow a^T = 2a - 2 \rightarrow a^T - 2a + 2 = 0 \begin{cases} a = 2 \checkmark \\ a = 1 \times \end{cases}$

$f(x) = \{(1, 4), (1, 2), (2, 1)\}$

$$x=1 \rightarrow x^2-1 = ax+b \rightarrow a+b=0 \rightarrow a=-b$$

$$x=2 \rightarrow ax+b = x^2 \rightarrow 2a+b=1 \rightarrow 2(-b)+b=1 \rightarrow -b=1 \rightarrow \boxed{b=-1} \\ \boxed{a=1}$$

$$axb = -45$$

$$x=k \rightarrow 2k-4 = 4-4k \rightarrow 6k=8 \rightarrow k = \frac{4}{3}$$

الف) $y'' - 4y = x^2 - 4x + 4 \xrightarrow{x=1} y(y'-4) = 0 \begin{cases} y=0 \\ y=1+\sqrt{4} \\ y=1-\sqrt{4} \end{cases} x \text{ تابع نیست}$

ب) $\begin{cases} |y_1| = 1, |x_1| \\ |y_2| = 1, |x_2| \end{cases} \xrightarrow{x_1=x_2} |y_1| = |y_2| \rightarrow y_1 = \pm y_2 \quad x \text{ تابع نیست}$

ج) $|y| = \sqrt{1-\cos x} \xrightarrow{x=0} |y| = \sqrt{2} \rightarrow y = \pm \sqrt{2} \quad x \text{ تابع نیست}$

الف) $\begin{cases} \sqrt[3]{y_1} = -x_1^2 + 2x_1 - 2 \\ \sqrt[3]{y_2} = -x_2^2 + 2x_2 - 2 \end{cases} \xrightarrow{x_1=x_2} \sqrt[3]{y_1} = \sqrt[3]{y_2} \rightarrow y_1 = y_2 \quad x \text{ تابع است}$

ب) $\begin{cases} y_1 + y_2 = 5x_1 \\ y_1 + y_2 = 5x_2 \end{cases} \xrightarrow{x_1=x_2} y_1 + y_2 = y_1 + y_2 \rightarrow y_1 - y_2 = y_2 - y_1 \rightarrow y_1 - y_2 = 0 \rightarrow y_1 = y_2$

$(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) = 0$

$\begin{matrix} y_1 - y_2 = 0 \\ y_1^2 + y_1 y_2 + y_2^2 = 0 \end{matrix} \rightarrow \begin{matrix} y_1 = y_2 \\ y_1^2 + y_1^2 + y_1^2 = 0 \end{matrix} \rightarrow \begin{matrix} y_1 = y_2 \\ 3y_1^2 = 0 \end{matrix} \rightarrow \begin{matrix} y_1 = y_2 \\ y_1 = 0 \end{matrix}$

الف) $x \sin y = y \sin x \xrightarrow{x=y} y \in \mathbb{R} \quad x \text{ تابع نیست}$

ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \rightarrow \frac{x}{y} + \frac{y}{x} + 2\sqrt{\frac{x}{y} \cdot \frac{y}{x}} = 2 \rightarrow \frac{x^2 + y^2}{xy} = 2 \rightarrow \frac{x^2 + y^2}{xy} = 2$

$x=y$ تابع نقطه است

$(x-y) \dots \rightarrow \frac{x-y}{x-y} = 1$

$2xy = x^2 + y^2 \rightarrow x^2 + y^2 - 2xy = 0 \rightarrow (x-y)^2 = 0$