

الف $\rightarrow 9x^2 - 6x - 9 = 0 \rightarrow x^2 - 2x - 3 = 0 \rightarrow (x-3)(x+1) = 0 \quad x=3 \quad x=-1 \rightarrow x = \frac{3}{1} = 3 \quad x = -\frac{1}{1} = -1$

ب $\rightarrow 3x^2 - 11x - 4 = 0 \rightarrow x^2 - 11x - 4 = 0 \rightarrow (x-9)(x+1) = 0 \quad x=9 \quad x=-1 \rightarrow x = \frac{9}{1} = 9 \quad x = -\frac{1}{1} = -1$

ج 1 $\rightarrow 4x^2 - 4x - 3 = 0 \rightarrow x^2 - x - 12 = 0 \rightarrow (x-4)(x+3) = 0 \quad x=4 \quad x=-3 \rightarrow x = \frac{4}{1} = 4 \quad x = -\frac{3}{1} = -3$

د $\rightarrow 2x^2 - 5x - 12 = 0 \rightarrow x^2 - 5x - 12 = 0 \rightarrow (x-8)(x+3) = 0 \quad x=8 \quad x=-3 \rightarrow x = \frac{8}{1} = 8 \quad x = -\frac{3}{1} = -3$

1

الف $\rightarrow x^2 - 5x - 14 = 0 \rightarrow (x-7)(x+2) = 0 \quad x=7 \quad x=-2$

ب $\rightarrow 2x^2 + 5x + 3 = 0 \rightarrow \Delta = (5)^2 - 4(2)(3) = 25 - 24 = 1 \quad x = \frac{-5 \pm 1}{4} = -1 \quad x = -\frac{3}{2}$

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ج 1 $\rightarrow x^2 + 2x + 3 = 0 \rightarrow \Delta = 4 - 12 = -8 < 0 \rightarrow$ ریشه ندارد

د $\rightarrow 3x^2 + 4x - 2 = 0 \rightarrow \Delta = 16 + 24 = 40 \quad x = \frac{-4 \pm \sqrt{40}}{6}$

3

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

$\hookrightarrow A \times B \rightarrow \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2), (3, 3)\}$

$\hookrightarrow B \times B \rightarrow \{(2, 2), (2, 3), (3, 2), (3, 3)\}$

$AB - B^2 = \{(1, 2), (1, 3)\}$

3

الف $\rightarrow \begin{cases} (3, m^2) / (3, m+2) \\ \hookrightarrow m^2 = m+2 \rightarrow m(m-1) = 2 \end{cases} \begin{cases} m=2 \rightarrow x \rightarrow (3, 4), (2, 1) \leftarrow x \\ m=-1 \rightarrow \checkmark \end{cases} \rightarrow m=-1$

ب $\rightarrow \begin{cases} (3, m^2) / (3, m+2) \\ \hookrightarrow m^2 = m+2 \rightarrow m(m-1) = 2 \end{cases} \begin{cases} m=2 \rightarrow \text{if } m=2 \quad (2, 1), (2, 4) \leftarrow x \\ m=-1 \rightarrow x \rightarrow (-1, 4), (-1, 3) \leftarrow x \end{cases} \rightarrow m=2$

4

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

$x^2 = 4x-2 \rightarrow x^2 - 4x + 2 = 0 \rightarrow (x-2)(x-1) = 0$

$\hookrightarrow \textcircled{2} \quad \textcircled{1}$

$(x^2, 4x+2) \rightarrow (4, 1)$

$\rightarrow x=2$

$\rightarrow (1, 2) \rightarrow \neq (1, 1) \quad x$

5

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

$$\begin{cases} x^2 - ax - b - 1 = 0 \\ x^3 - ax - b = 0 \rightarrow 2 \\ x^3 - x^2 + 1 = 0 \end{cases}$$

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$$\rightarrow x^2 - 1 \quad x \leq 1 \rightarrow 1^2 - 1 = 0$$

$$\rightarrow ax + b \quad 1 \leq x \leq 2 \rightarrow 1a + b = 0, \quad 2a + b = 1$$

$$\rightarrow x^3 \quad x \geq 2 \rightarrow 2^3 = 8$$

$$\begin{cases} 1a + b = 0 \\ 2a + b = 1 \end{cases} \Rightarrow a = -1, b = 1 \Rightarrow ax + b = -x + 1$$

$$f(x) = \begin{cases} x^2 - 1 & x \leq 1 \\ -x + 1 & 1 \leq x \leq 2 \\ x^3 & x \geq 2 \end{cases}$$

$$2K - 3 = 4 - 3K$$

$$\Leftrightarrow 2K + 3K = 4 + 3 \Rightarrow 5K = 7 \rightarrow K = \frac{7}{5} = 1.4$$

7

نموده اند 1- $\rightarrow$ if $x=0$ $\rightarrow y^3 - 4y = x^2 - 4x + 3 \rightarrow y^3 - 4y = 3 \rightarrow y(y^2 - 4) = 3 \rightarrow y(y-2)(y+2) = 3$

if $x=0$ $\rightarrow |y| = 3 \Rightarrow y = \pm 3$

2- $\rightarrow |y| = \sqrt{1 - \cos x} \rightarrow$ if $\cos x < 1 \rightarrow \sqrt{1 - \cos x} \rightarrow \text{if } \cos x = 1 \rightarrow y = 0$

3- $y^2 + x^2 + 2x + 1 \rightarrow y^2 = -x^2 - 2x - 1$

4- $\sqrt[3]{y} + x^2 = 2x - 2 \rightarrow \sqrt[3]{y} = -x^2 + 2x - 2$

5- $y_1^3 + 2y_1 = \omega x_1$
 $y_2^3 + 2y_2 = \omega x_2$
 $\rightarrow y_1^3 - y_2^3 + 2y_1 - 2y_2 = 0$
 $\rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2) = 0$

6- $x \sin y = y \sin x \rightarrow$ if $x = \frac{\pi}{2} \Rightarrow \frac{\pi}{2} \times \sin y = y \Rightarrow y = \frac{\pi}{2}$



10

7- $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \rightarrow a + \frac{1}{a} = 2 \Rightarrow a = 1 \Rightarrow \sqrt{\frac{x}{y}} = 1 \Rightarrow \frac{x}{y} = 1 \Rightarrow x = y$

8- $\sqrt{\frac{x}{y}} = a \Rightarrow \sqrt{\frac{y}{x}} = \frac{1}{a} \Rightarrow D = \mathbb{R} - \{0\}$