

ا) $4x^2 - 5x - 2 = 0$

$$x^2 - 5x - 34 = 0$$

$$(x - 9)(x + 4) = 0 \rightarrow x = \frac{9}{4}, -\frac{4}{4}$$

ب) $3x^2 - 8x - 9 = 0$

$$x^2 - 8x - 9 = 0$$

$$(x - 9)(x + 1) = 0 \rightarrow x = \frac{9}{1}, -\frac{1}{1}$$

ج) $5x^2 - 6x - 3 = 0$

$$x^2 - 6x - 12 = 0$$

$$(x - 6)(x + 2) = 0 \rightarrow x = \frac{6}{1}, -\frac{2}{1}$$

د) $2x^2 - 5x - 12 = 0$

$$x^2 - 5x - 24 = 0$$

$$(x - 8)(x + 3) = 0 \rightarrow x = \frac{8}{1}, -\frac{3}{1}$$

هـ) $x^2 - 5x - 14 = 0$

$$(x - 7)(x + 2) = 0$$

$$x = 7, x = -2$$

1

$$x^2 + \omega x + \omega = 0$$

~~$$x^2 + \omega x + \omega = 0$$~~

$$a + c = b$$

$$x = -1$$

$$x = \frac{-\omega}{1}$$

2

$$x^2 + \omega x + \omega = 0$$

$$\Delta = b^2 - 4ac = \omega - 4\omega < 0 \rightarrow \text{قوة سالبة}$$

$$3) \quad x^2 + \omega x - \omega = 0$$

~~$$x^2 + \omega x - \omega = 0$$~~

$$\Delta = b^2 - 4ac = \omega^2$$

$$x = \frac{-\omega \pm \sqrt{\omega^2}}{2}$$

12

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

$$B^2 = B \times B = \{(\omega, \omega), (\omega, \omega^2), (\omega^2, \omega), (\omega^2, \omega^2)\}$$

~~A~~
$$A \times B - B^2 = \{(1, 1), (1, \omega)\}$$

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

13

$$m^2 = m + \omega \rightarrow m^2 - m - \omega = 0$$

$$(m - \omega)(m + 1) = 0$$

$$\begin{cases} m = \omega \rightarrow (\omega, 1), (\omega, \omega) \times \\ m = -1 \end{cases}$$

۱)

$$g(x) = \{ (r, m^r), (r, 1), (m, 1), (a, m+r), (-r, m), (-1, r) \}$$

$$m^r = m+r$$

$$m^r - m - r = 0$$

$$(m-r)(m+1) = 0$$

$$\begin{cases} m=r \rightarrow (r, 1), (r, 1) \times \end{cases}$$

$$\begin{cases} m=-1 \rightarrow (-1, 1), (-1, 1) \times \end{cases}$$

$$m=-1 \rightarrow (-1, 1), (-1, 1) \times$$

نتیجه مستقیم نیست

$$f(x) = \{ (1, a^r), (1, a-r), (a^r, a+r) \} \quad (c)$$

$$a^r = a-r$$

$$a^r - a + r = 0$$

$$(a-r)(a-1) = 0$$

$$\begin{cases} a=r \rightarrow \checkmark \end{cases}$$

$$\begin{cases} a=1 \rightarrow (1, 1), (1, 1) \times \end{cases}$$

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

$$x=1 \rightarrow f(x) = a = a+b$$

$$x=r \rightarrow f(x) = r = ra+b$$

$$\Rightarrow \begin{cases} a = 1 \\ b = -1 \end{cases}$$

$$a \times b = -1$$

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

$$x = k \rightarrow f(x) = 2k - 3 = 3 - 2k$$

$$\omega k = 3$$

$$k = \frac{3}{\omega}$$

الف)

$$y^3 - 4y = x^2 - 4x + 3$$

تابع یکتا بر اساس نکته استاد

$$y^3 + y = \text{تابع است}$$

$$y^3 - y = \text{تابع نیست}$$

ب) $|x| + |y| = 3$

$$x = 0 \rightarrow |y| = 3$$

$$y = \pm 3 \text{ تابع نیست}$$

ج) $|y| = \sqrt{1 - \cos x}$

$$\cos x = 1 \rightarrow x = 0 \rightarrow |y| = 0 \rightarrow y = 0$$

$$\cos x = -1 \rightarrow x = \pi \rightarrow |y| = \sqrt{1 - (-1)} = \sqrt{2} \rightarrow y = \pm \sqrt{2}$$

$$x = \pi \rightarrow \cos x = -1$$

$$|y| = \sqrt{2} \rightarrow y = \pm \sqrt{2} \text{ تابع نیست}$$

$$1) \quad y^2 + x^2 + 2x + 1 = 0$$

$$y^2 + (x+1)^2 = 0 \rightarrow \text{چون دایره نامنفی صفر نیست هر دو صفر}$$

$$y = 0, x = -1$$

نقطه و تابع است!

(9)

الف)

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

$$\begin{matrix} (y_1, x_1) \\ (y_2, x_2) \end{matrix} \Rightarrow \begin{matrix} x_1 = x_2 \rightarrow y_1 = y_2 \\ \sqrt[3]{y_1} = \sqrt[3]{y_2} \rightarrow y_1 = y_2 \end{matrix}$$

ب)

$$y^3 + 2y = \omega x$$

$$\left. \begin{matrix} y_1^3 + 2y_1 = \omega x \\ y_2^3 + 2y_2 = \omega x \end{matrix} \right\} \Rightarrow y_1^3 + 2y_1 = y_2^3 + 2y_2 \rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2y_1 + 2y_2) = 0$$

$$(y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2y_1 + 2y_2) = 0$$

$$\rightarrow y_1 = y_2 \quad \text{یا} \quad y_1^2 + y_1y_2 + y_2^2 + 2y_1 + 2y_2 = 0$$

الف)

$$x \sin y = y \sin x$$

$$x = 0 \rightarrow y = 0, \pi, 2\pi, \dots$$

این تابع نیست

ب)

$$\left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} \right) = 2$$

$$t + \frac{1}{t} = 2 \rightarrow \frac{t^2 + 1}{t} = 2$$

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

تابع هست

$$x = y \quad \checkmark$$