

الف) $4x^2 - 5x - 9 = 0$ $x^2 - 5x - 9 = 0$ $(x-9)(x+1) = 0$ $x = 9$ $x = -1$ ب) $9x^2 - 11x - 2 = 0$ $x^2 - 11x - 2 = 0$ $(x-9)(x+1) = 0$ $x = 9$ $x = -1$ ج) $5x^2 - 5x - 2 = 0$ $x^2 - 5x - 12 = 0$ $(x-8)(x+3) = 0$ $x = 8$ $x = -3$ د) $2x^2 - 5x - 12 = 0$ $x^2 - 5x - 12 = 0$ $(x-8)(x+3) = 0$ $x = 8$ $x = -3$	1
الف) $x^2 - 5x - 12 = 0$ $(x-7)(x+2) = 0$ $x = 7$ $x = -2$ ب) $2x^2 + 5x + 2 = 0$ $x^2 + 5x + 2 = 0$ $(x+2)(x+1) = 0$ $x = -2$ $x = -1$ ج) $x^2 + 2x + 3 = 0$ $\Delta = 4 - 12 = -8 < 0$ $\Delta < 0$ $\Rightarrow$ هیچ جوابی ندارد د) $3x^2 + 4x - 2 = 0$ $\Delta = 16 + 24 = 40$ $x = \frac{-4 \pm \sqrt{40}}{6}$ $x = \frac{-2 \pm \sqrt{10}}{3}$	2
$A = \{1, 2, 3\}$ $B = \{4, 5, 6\}$ $A \times B = B \times A$ $\{(1, 4), (1, 5), (1, 6), (2, 4), (2, 5), (2, 6), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (5, 1), (5, 2), (5, 3), (6, 1), (6, 2), (6, 3)\} = \{(1, 4), (1, 5), (1, 6), (2, 4), (2, 5), (2, 6), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (5, 1), (5, 2), (5, 3), (6, 1), (6, 2), (6, 3)\}$	3
الف) $f(x) = \{(x, m^2), (x, 1), (x, m), (x, m+1), (x, m+2), (x, 1), (x, m)\}$ $m^2 = m + 2$ $m^2 - m - 2 = 0$ $(m-2)(m+1) = 0$ $m = 2$ $m = -1$ ب) $g(x) = \{(x, m^2), (x, 1), (x, m), (x, m+1), (x, m+2), (x, 1), (x, m)\}$ $m^2 = m + 2$ $(m-2)(m+1) = 0$ $m = 2$ $m = -1$	4
$f(x) = \{(1, a^2), (1, a-2), (a^2, a+2)\}$ $a^2 = a - 2$ $a^2 - a + 2 = 0$ $(a-2)(a-1) = 0$ $a = 2$ $a = 1$ $a^2 = a + 2$ $a^2 - a - 2 = 0$ $(a-2)(a+1) = 0$ $a = 2$ $a = -1$	5

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

$$x=2 \Rightarrow ax + b = x^2 \quad (a \times b = -4)$$

$$2a + b = 4 \quad \begin{cases} a = 1 \\ b = -4 \end{cases}$$

$$2x - 2 \quad x \geq 17$$

$$E - 2x \quad x \leq K$$

$$2x - 17 = K - 17x$$

$$\omega K = 17$$

$$K = \frac{17}{\omega} \quad [1.8]$$

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

ب) $|x| + |y| = 3 \xrightarrow{\text{مثال نقطه}} x = 0 \quad |y| = 3 \Rightarrow y = \pm 3$ تابع نیست

ج) $|y| \sqrt{1 - \cos x}$ $1 - \cos x > 0 \Rightarrow \cos x < 1$ $\cos x \leq 1$ $\cos x = -1$ $y = \pm \sqrt{2}$ تابع نیست

د) $y^2 + x^2 + 2x + 1 = 0 \quad y^2 + (x+1)^2 = 0$ $y^2 = 0 \quad y = 0$ $x+1 = 0 \quad x = -1$ $(-1, 0)$ نقطه
 یک نقطه
 تابع است

الف) $\sqrt[3]{y} + x^2 = 2x - 2 \quad \sqrt[3]{y_1} + x_1^2 = 2x_1 - 2 \quad x_1 = x_2$
 $\sqrt[3]{y_2} + x_2^2 = 2x_2 - 2$
 $\sqrt[3]{y_1} = \sqrt[3]{y_2} \Rightarrow y_1 = y_2$ تابع است

ب) $y^3 + 2y = \omega x \quad y_1^3 + 2y_1 = \omega x_1 \quad x_1 = x_2$
 $y_2^3 + 2y_2 = \omega x_2$
 $y_1^3 + 2y_1 = y_2^3 + 2y_2$ تابع است
 $y_1^3 - y_2^3 + 2y_1 - 2y_2 = 0$
 $(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + 2(y_1 - y_2) = 0 \quad (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 2) = 0$
 $y_1 - y_2 = 0 \quad y_1 = y_2$

الف) $x \sin y = y \sin x \Rightarrow x = 0 \quad (x=0) \Rightarrow y(\sin 0) = 0 = y(0)$
 پس برای $y, x=0$ می توانه این بهمانی عدد باشد $\Rightarrow$ تابع نیست

ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \quad t = \sqrt{\frac{x}{y}} \quad t + \frac{1}{t} = 2$
 $\sqrt{\frac{x}{y}} = 1 \Rightarrow \frac{x}{y} = 1 \quad x = y$ $t^2 + 1 = 2t \quad t^2 - 2t + 1 = 0 \quad (t-1)^2 = 0 \quad t = 1$