

الف) $4x^2 - 5x - 4 = 0 \rightarrow x^2 - 5x - 4 = 0 \rightarrow (x-9)(x+2) = 0 \rightarrow x = \frac{9}{1} = 9, x = \frac{-2}{1} = -2$ ب) $3x^2 - 8x - 3 = 0 \rightarrow x^2 - 8x - 9 = 0 \rightarrow (x-9)(x+1) = 0 \rightarrow x = \frac{9}{1} = 9, x = \frac{-1}{1} = -1$ ج) $2x^2 - 2x - 4 = 0 \rightarrow x^2 - 2x - 2 = 0 \rightarrow (x-4)(x+2) = 0 \rightarrow x = \frac{4}{1} = 4, x = \frac{-2}{1} = -2$ د) $2x^2 - 2x - 12 = 0 \rightarrow x^2 - 2x - 6 = 0 \rightarrow (x-8)(x+2) = 0 \rightarrow x = \frac{8}{1} = 8, x = \frac{-2}{1} = -2$	۱
الف) $x^2 - 5x - 12 = 0 \rightarrow (x-7)(x+2) = 0 \rightarrow x = 7, x = -2$ ب) $2x^2 + 5x + 2 = 0 \rightarrow a+c = b \rightarrow x = -1, x = -\frac{c}{a} \rightarrow x = -1, x = -\frac{2}{2} = -1$ ج) $x^2 + 2x + 3 = 0 \rightarrow \Delta = b^2 - 4ac \rightarrow 2 - 12 = -10 \rightarrow \Delta < 0 \rightarrow$ <u>ریشه ندارد</u> د) $3x^2 + 4x - 2 = 0 \rightarrow \Delta = b^2 - 4ac \rightarrow 16 + 24 = 40 \rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-4 \pm \sqrt{40}}{6} = \frac{-2 \pm \sqrt{10}}{3} = \frac{-1 \pm \sqrt{10}}{3}$	۲
$A \times B = \{(1,2), (1,3), (2,2), (2,3), (3,2), (3,3)\}$ $B \times B = \{(2,2), (2,3), (3,2), (3,3)\}$ $A \setminus B = \{(1,2), (1,3)\}$	۳
الف) $f(x) = \{(\frac{3}{2}, m^2), (2, 1), (-3, m), (-2, m), (\frac{3}{2}, m+2), (m, 2)\} \rightarrow m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \xrightarrow{a+c=b} m = -1, m = \frac{c}{a} = 2$ if $m = 2 \rightarrow \{(2, 1), (2, 2)\} \rightarrow$ تابع نیست if $m = -1 \rightarrow \{(3, 1), (2, 1), (-2, -1), (-2, -1), (3, 1), (-1, 2)\} \rightarrow$ تابع هست $\{m = -1\}$ ب) $g(x) = \{(\frac{3}{2}, m^2), (2, 1), (m, 2), (\frac{3}{2}, m+2), (-2, m), (-1, 3)\} \rightarrow m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \xrightarrow{a+c=b} m = -1, m = \frac{c}{a} = 2$ if $m = 2 \rightarrow \{(2, 1), (2, 2)\} \rightarrow$ تابع نیست if $m = -1 \rightarrow \{(-1, 2), (-1, 3)\} \rightarrow$ تابع نیست این تابع به ازای هیچ مقادیری از m برقرار نیست.	۴
$f(x) = \{(1, a^2), (1, 3a-2), (a^2, 3a+2)\}$ $\rightarrow a^2 = 3a-2 \rightarrow a^2 - 3a + 2 = 0 \xrightarrow{a+b+c=0} a = 1, a = \frac{c}{a} = 2$ if $a = 1 \rightarrow \{(1, 1), (1, 1), (1, 5)\} \rightarrow$ تابع نیست if $a = 2 \rightarrow \{(1, 4), (1, 4), (4, 8)\} \rightarrow$ تابع هست $\{a = 2\}$	۵

$$f(n) = \begin{cases} n^2 - 1 & n \leq 1 \\ an + b & 1 < n \leq 2 \\ n^2 & n > 2 \end{cases} \quad \begin{cases} \xrightarrow{n=1} 1-1 = a+b \rightarrow a+b=0 \rightarrow a=-b \\ \xrightarrow{n=2} 4+2b = 4 \rightarrow -2b+2b=4 \rightarrow b=1, a=1 \end{cases}$$

$$\Rightarrow a \times b = 1 \times 1 = \boxed{-45}$$

6

$$f(n) = \begin{cases} 2n - 3 & n > K \\ 2 - 3n & n \leq K \end{cases} \quad \begin{cases} \xrightarrow{n=K} 2K - 3 = 2 - 3K \rightarrow 5K = 5 \rightarrow K = \frac{5}{5} = 1 \end{cases}$$

7

$$\text{الف) } y^2 - 4y = x^2 - 5x + 3 \rightarrow \text{میلانیدن } x=1 \rightarrow y(y^2 - 4) = 0 \rightarrow y = 0, \pm 2 \quad \boxed{\text{تابع نیست}}$$

$$\text{ب) } |x| + |y| = 3 \rightarrow \text{میلانیدن } x=1 \rightarrow |y| = 2 \rightarrow y = \pm 2 \quad \boxed{\text{تابع نیست}}$$

$$\text{ج) } |y| = \sqrt{1 - \cos x} \rightarrow \text{میلانیدن } x=90^\circ \rightarrow \cos 90^\circ = 0 \rightarrow |y| = 1 \rightarrow y = \pm 1 \quad \boxed{\text{تابع نیست}}$$

8

$$\text{د) } y^2 + x^2 + 2x + 1 = 0 \rightarrow y^2 + (x+1)^2 = 0 \rightarrow (-1, 0) \text{ در نقطه } (0,0) \text{ قرار دارد.} \quad \boxed{\text{تابع نیست}}$$

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

9

$$\text{ب) } y^3 + xy = ax \rightarrow y_1^3 + xy_1 = ax \rightarrow y_2^3 + xy_2 = ax \rightarrow y_1^3 - y_2^3 + xy_1 - xy_2 = 0 \\ y_1^3 - y_2^3 + x(y_1 - y_2) = 0 \rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + x) = 0 \rightarrow y_1 - y_2 = 0 \rightarrow y_1 = y_2 \\ \rightarrow y_1 = \frac{-3x \pm \sqrt{9x^2 - 4(x^2 + 2)}}{2} \rightarrow \Delta = -4x^2 - 8 \rightarrow \Delta < 0 \rightarrow x \text{ حقیقی ندارد.} \quad \boxed{\text{تابع هست}}$$

$$\text{الف) } x \sin y = y \sin x \rightarrow \text{میلانیدن } x=0 \rightarrow y = 0 \rightarrow \boxed{\text{تابع نیست}}$$

10

$$\text{ب) } \sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \rightarrow \frac{\sqrt{x}}{\sqrt{y}} + \frac{\sqrt{y}}{\sqrt{x}} = 2 \rightarrow \frac{x+y}{\sqrt{xy}} = 2 \rightarrow x+y - 2\sqrt{xy} = 0 \\ \rightarrow (\sqrt{x} - \sqrt{y})^2 = 0 \rightarrow \sqrt{x} = \sqrt{y} \rightarrow x = y \rightarrow \boxed{\text{تابع هست}}$$