

الف) $x^2 - 2x - 6 = 0 \Rightarrow$ $x^2 - 2x - 6 = 0 \Rightarrow (x-9)(x+4) = 0$ $\Rightarrow x = \frac{9}{1}$ $\Rightarrow x = -\frac{4}{1}$ ب) $x^2 - 8x - 9 = 0 \Rightarrow$ $x^2 - 8x - 9 = 0 \Rightarrow (x-9)(x+1) = 0$ $\Rightarrow x = \frac{9}{1}$ $\Rightarrow x = -\frac{1}{1}$	ج) $x^2 - 4x - 12 = 0 \Rightarrow$ $x^2 - 4x - 12 = 0 \Rightarrow (x-6)(x+2) = 0$ $\Rightarrow x = \frac{6}{1}$ $\Rightarrow x = -\frac{2}{1}$ د) $x^2 - 2x - 4 = 0 \Rightarrow$ $x^2 - 2x - 4 = 0 \Rightarrow (x-2)(x+2) = 0$ $\Rightarrow x = \frac{2}{1}$ $\Rightarrow x = -\frac{2}{1}$	1	
الف) $x^2 - 2x - 14 = 0 \Rightarrow$ $(x-7)(x+2) = 0 \Rightarrow$ $\Rightarrow x = \frac{7}{1}$ $\Rightarrow x = -\frac{2}{1}$ ب) $x^2 + 2x + 3 = 0 \Rightarrow$ $x^2 + 2x + 3 = 0 \Rightarrow (x+2)(x+1) = 0$ $\Rightarrow x = -\frac{2}{1}$ $\Rightarrow x = -\frac{1}{1}$	ج) $x^2 + 2x + 2 = 0 \Rightarrow \Delta = b^2 - 4ac =$ $4 - 12 = -8$ معادله ریشه حقیقی ندارد د) $x^2 + 2x - 2 = 0 \Rightarrow \Delta = b^2 - 4ac =$ $4 - 4 \times 1 \times (-2) = 12$ $\Rightarrow x = \frac{-2 \pm \sqrt{12}}{2}$	2	
$A \times B = \{(1,2), (1,3), (2,2), (2,3), (3,2), (3,3)\}$ $B^c = B \times B = \{(2,2), (2,3), (3,2), (3,3)\}$ $\Rightarrow A \times B - B^c = \{(1,2), (1,3)\}$			3
الف) $m^2 = m + 2 \Rightarrow (m-2)(m+1) = 0 \Rightarrow$ $\Rightarrow m = 2 \times$ غ. ق. ق. $\Rightarrow m = -1 \checkmark$ ق. ق. ب) $m^2 = m + 2 \Rightarrow (m-2)(m+1) = 0 \Rightarrow$ $\Rightarrow m = 2 \times$ غ. ق. ق. $\Rightarrow m = -1 \times$ غ. ق. ق. $\Rightarrow$ به ازای هر عدد صحیح m متناهی نرسیده			4
$a^2 = 3a - 2 \Rightarrow (a-2)(a-1) = 0 \Rightarrow$ $\Rightarrow a = 2 \checkmark$ ق. ق. $\Rightarrow a = 1 \times$ غ. ق. ق. $\Rightarrow a = 2$			5

$$\left. \begin{aligned} f(1) &= 1^2 - 1 = a + b \Rightarrow a + b = 0 \\ f(2) &= 2^2 - 1 = 2a + b \Rightarrow 2a + b = 1 \end{aligned} \right\} \Rightarrow a = 1, b = -1$$

$$\Rightarrow a \times b = \textcircled{-1}$$

$$f(k) = 2k - 1 = 4 - 2k \Rightarrow 2k = 4 \Rightarrow k = \textcircled{\frac{4}{2}}$$

$$\text{الف) } \text{if } x=1 \Rightarrow y(y^2-6)=0 \Rightarrow \begin{cases} y=0 \\ y=\pm\sqrt{6} \end{cases} \Rightarrow \text{تابع نیست} \quad \times$$

$$\text{ب) } \text{if } x=0 \Rightarrow |y|=2 \Rightarrow y=\pm 2 \Rightarrow \text{تابع نیست} \quad \times$$

$$\text{ج) } \text{if } x=\frac{\pi}{2} \Rightarrow |y|=\sqrt{1-\cos(\frac{\pi}{2})}=1 \Rightarrow y=\pm 1 \Rightarrow \text{تابع نیست} \quad \times$$

$$\text{د) } y^2 = -x^2 - 2x - 1 = -(x+1)^2 \Rightarrow x=-1, y=0 \Rightarrow \text{تابع است} \quad \checkmark$$

$$\text{الف) } \left. \begin{aligned} \sqrt{y_1} &= -x^2 + 2x - 2 \\ \sqrt{y_2} &= -x^2 + 2x - 2 \end{aligned} \right\} \Rightarrow \sqrt{y_1} = \sqrt{y_2} \Rightarrow y_1 = y_2 \Rightarrow \text{تابع است} \quad \checkmark$$

$$\text{ب) } \left. \begin{aligned} y_1^2 + 2y_1 &= 2x \\ y_2^2 + 2y_2 &= 2x \end{aligned} \right\} \Rightarrow y_1^2 + 2y_1 = y_2^2 + 2y_2 \Rightarrow (y_1^2 - y_2^2) + 2(y_1 - y_2) = 0$$

(ادامه نیست) $\otimes$

$$\text{الف) } \text{if } x=0 \Rightarrow 0 = y \times 0 \Rightarrow y \in \mathbb{R}$$

$$\Rightarrow \text{تابع نیست} \quad \times$$

$$\text{ب) } \text{حرفه‌ای به توان 2} \Rightarrow \frac{x}{y} + \frac{y}{x} + 2 = 4 \Rightarrow y^2 - 2xy + x^2 = 0$$

$$\Rightarrow \Delta = 4x^2 - 4x^2 = 0 \Rightarrow \text{تابع است} \quad \checkmark$$

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

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

$$\Rightarrow \begin{cases} y_1 - y_2 = 0 \rightarrow y_1 = y_2 \\ y_1^2 + y_2 y_1 + y_2^2 + 2 = 0 \end{cases}$$

$$y_1 = \frac{-y_2 \pm \sqrt{\Delta}}{2} \rightarrow \Delta = y_2^2 - 4(y_2^2 + 2) = y_2^2 - 4y_2^2 - 8 = -3y_2^2 - 8$$

$\Rightarrow \Delta < 0 \Rightarrow$ چون Δ همواره منفی است $\Rightarrow y_1 = y_2 \Rightarrow$ تابع است $\checkmark$
حالت دوم نمی‌تواند برقرار باشد