

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) $x^2 - 2x - 4 = 0 \Rightarrow$
 $x^2 - 2x - 4 = 0 \Rightarrow (x-2)(x+2) = 0$
 $\Rightarrow x = \frac{2}{1}$
 $\Rightarrow x = -\frac{2}{1}$

الف) $x^2 - 2x - 14 = 0 \Rightarrow$
 $(x-7)(x+2) = 0 \Rightarrow x = \frac{7}{1}$
 $\Rightarrow x = -\frac{2}{1}$
 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) $x^2 + 2x + 1 = 0 \Rightarrow \Delta = b^2 - 4ac =$
 $4 - 12 = -8$
 د) $x^2 + 2x - 2 = 0 \Rightarrow \Delta = b^2 - 4ac =$
 $4 - 4 \times 1 \times (-2) = 12$
 $\Rightarrow x = \frac{-2 \pm \sqrt{12}}{2}$

$A \times B = \{(1,2), (1,3), (2,2), (2,3), (3,2), (3,3)\}$
 $B^2 = B \times B = \{(2,2), (2,3), (3,2), (3,3)\}$
 $\Rightarrow A \times B - B^2 = \{(1,2), (1,3)\}$

الف) $m^2 = m + 2 \Rightarrow (m-2)(m+1) = 0 \Rightarrow$
 $m = 2$ غ. ق. ق.
 $m = -1$ ق. ق. غ.
 $\Rightarrow m = -1$
 ب) $m^2 = m + 2 \Rightarrow (m-2)(m+1) = 0 \Rightarrow$
 $m = 2$ غ. ق. ق.
 $m = -1$ غ. ق. ق.
 $\Rightarrow$ به از از هر دو جواب خارج می شود

$a^2 = 3a - 2 \Rightarrow (a-2)(a-1) = 0 \Rightarrow$
 $a = 2$ ق. ق. ق.
 $a = 1$ غ. ق. ق.
 $\Rightarrow a = 2$

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

$$\Rightarrow a \times b = (-1) \checkmark$$

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

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

ب) $x=0 \Rightarrow |y|=2 \Rightarrow y=\pm 2 \Rightarrow$ تابع نیست $\times$

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

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

الف) $\sqrt{y_1} = -x^2 + 2x - 2 \Rightarrow \sqrt{y_1} = \sqrt{y_2} \Rightarrow y_1 = y_2 \Rightarrow$ تابع است $\checkmark$

ب) $\begin{cases} y_1^2 + 2y_1 = 2x \\ y_2^2 + 2y_2 = 2x \end{cases} \Rightarrow \begin{cases} y_1^2 + 2y_1 = y_2^2 + 2y_2 \\ (y_1^2 - y_2^2) + 2(y_1 - y_2) = 0 \end{cases} \Rightarrow (y_1 - y_2)(y_1 + y_2 + 2) = 0$ (ادامه نیست) $\times$

الف) $x=0 \Rightarrow 0 = y \times 0 \Rightarrow y \in \mathbb{R} \Rightarrow$ تابع نیست $\times$

ب) $\frac{x}{y} + \frac{y}{x} + 2 = 4 \Rightarrow y^2 - 2xy + x^2 = 0 \Rightarrow \Delta = 4x^2 - 4x^2 = 0 \Rightarrow$ تابع است $\checkmark$

۱۰-ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2$

این عبارت تنها زمانی برقرار است که $\sqrt{\frac{x}{y}} = 1$ باشد پس

$\sqrt{\frac{x}{y}} = 1 \Rightarrow \frac{x}{y} = 1 \Rightarrow x = y$ و $(x, y \neq 0)$



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

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

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

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

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