

الف) $q^2 - 4q - 2 = 0 \rightarrow q^2 - 4q - 36 = 0 \Rightarrow (q - \frac{4}{2})(q + 2) \rightarrow q_1 = \frac{4}{2}$
 $\rightarrow q_1 = 2$
 $\rightarrow q_2 = -\frac{4}{2}$
 ب) $q^2 - 8q - 2 = 0 \rightarrow q^2 - 8q - 9 = 0 \Rightarrow (q - 9)(q + 1) \rightarrow q_1 = 9$
 $\rightarrow q_2 = -1$
 ج) $q^2 - 6q - 2 = 0 \rightarrow q^2 - 6q - 12 = 0 \Rightarrow (q - \frac{6}{2})(q + 2) \rightarrow q_1 = \frac{6}{2}$
 $\rightarrow q_2 = -2$
 د) $q^2 - 4q - 12 = 0 \rightarrow q^2 - 4q - 24 = 0 \Rightarrow (q - 6)(q + 4) \rightarrow q_1 = 6$
 $\rightarrow q_2 = -4$

الف) $q^2 - 4q - 12 = 0 \rightarrow (q - 6)(q + 2) \rightarrow q_1 = 6$
 $\rightarrow q_2 = -2$
 ب) $q^2 + 4q + 4 = 0 \rightarrow q^2 + 4q + 4 = 0 \Rightarrow (q + 2)(q + 2) \rightarrow q_1 = -2$
 $\rightarrow q_2 = -2$
 ج) $\Delta = b^2 - 4ac \rightarrow 4 - 4(1)(-2) = -8 < 0$ $\Delta < 0$ $\rightarrow$ ریشه ندارد
 د) $\frac{a}{3}q^2 + \frac{b}{2}q - \frac{c}{2} = 0 \rightarrow \Delta = b^2 - 4ac \rightarrow 4 - 4(2)(-2) = 32 \rightarrow q = \frac{-2 \pm \sqrt{32}}{4}$
 $\rightarrow q_1 = \frac{-2 + \sqrt{32}}{4}$
 $\rightarrow q_2 = \frac{-2 - \sqrt{32}}{4}$

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

$B^2 = \{(2, 2), (2, 3), (3, 3), (3, 2)\}$

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

الف) $\{(2, m^2), (2, 1), (-2, m), (-2, m), (2, m+2), (m, 2)\}$
 $m^2 = m + 2 \rightarrow m^2 - m - 2 = 0 \Rightarrow (m - 2)(m + 1) \rightarrow m = 2$ $m = -1$
 ب) $\{(2, m^2), (2, 1), (m, 2), (2, m+2), (-2, m), (-2, 3)\}$
 $m^2 = m + 2 \rightarrow m^2 - m - 2 = 0 \Rightarrow (m - 2)(m + 1) \rightarrow m = 2$ $m = -1$
 ج) $m = 2$ $m = -1$

$f(a) = \{(1, a^2), (3, a-2), (a^2, 3a+2)\}$
 $a^2 = 3a - 2 \rightarrow a^2 - 3a + 2 = 0 \Rightarrow (a - 1)(a - 2) \rightarrow a = 1$
 $\rightarrow a = 2$

$$f(a) = \begin{cases} a^2 - 1 & a < 1 \\ a^2 + b & 1 \leq a \leq 2 \\ a^3 & a > 2 \end{cases} \quad \begin{matrix} a=1 \rightarrow 1^2 = a+b \rightarrow a+b=0 \\ a=2 \rightarrow 2a+b=1 \end{matrix} \quad \left. \begin{matrix} -a-b=0 \\ 2a+b=1 \end{matrix} \right\} \quad \begin{matrix} a=1 \\ b=-1 \end{matrix}$$

$a \times b = 1 \times -1 = -1$ ✓

$$f(a) = \begin{cases} 2a - 3 & a > k \\ 5 - 2a & a \leq k \end{cases} \quad a=k \rightarrow 2k - 3 = 5 - 2k \quad \Delta k = 4$$

$k = \frac{8}{4} = 2$ ✓

الف) $y^2 - 4y = a^2 - 4a + 3$
 $y^2 - y$ بر اساس نکته داخل جدول

ب) $|y| = \sqrt{1 - \cos \alpha}$ if $\alpha = 90^\circ$ $|y| = 1$

ج) $|a| + |y| = 3 \rightarrow |y| = 3$
 $(a=0)$ $y = \pm 3$ ✓

د) $y^2 + a^2 + 2a + 1 = 0$

$y^2 + (a+1)^2 = 0$

$(y=0)$

تابع مستقیم ✓

الف) $\sqrt[3]{y} + a^2 = 2a - 2 \rightarrow a_1 = a_2$

$\sqrt[3]{y_1} = -a_1^2 + 2a_1 - 2$
 $\sqrt[3]{y_2} = -a_2^2 + 2a_2 - 2$
 $\sqrt[3]{y_1} = \sqrt[3]{y_2}$
 $y_1 = y_2$ ✓

ب) $y^3 + 2y = \Delta a$ $\begin{cases} y_1^3 + 2y_1 = \Delta a_1 \\ y_2^3 + 2y_2 = \Delta a_2 \end{cases} \rightarrow y_1^3 + 2y_1 = y_2^3 + 2y_2$

$y_1^3 - y_2^3 = 2y_2 - 2y_1 \rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2) = 2(y_2 - y_1)$
 $\rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2) = 0$
 $(y_1 = y_2)$ ✓

$\Delta = y_2^2 - 4(y_2^2 + 2y_2 - 2) - 4 = -3y_2^2 - 8y_2 + 8$ ✓

الف) $a \sin y = y \sin a$ if $a=0 \Rightarrow y=0$ ✓

ب) $\sqrt{\frac{a}{y}} + \sqrt{\frac{y}{a}} = 2 \rightarrow a + \frac{1}{a} = 2 \Rightarrow a^2 + 1 = 2a$

$\sqrt{\frac{a}{y}} = a$

شرط $a \neq 0$ و y ثابت نه!

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

$(a=1)$ تابع مستقیم ✓

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

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

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

