

الف) $2x^2 - 5x - 6 = 0 \Rightarrow x^2 - 5x - 12 = 0 \Rightarrow (x-9)(x+2) = 0 \Rightarrow$ ریشه ها: $\frac{19}{2}$ و $-\frac{1}{2} \rightarrow \boxed{\frac{19}{2} \text{ و } -\frac{1}{2}}$

ب) $2x^2 - 11x - 9 = 0 \Rightarrow x^2 - 11x - 9 = 0 \Rightarrow (x-9)(x+1) = 0 \Rightarrow$ ریشه ها: $\frac{4}{3}$ و $-\frac{1}{3} \rightarrow \boxed{\frac{4}{3} \text{ و } -\frac{1}{3}}$

ج) $2x^2 - 4x - 3 = 0 \Rightarrow x^2 - 4x - 12 = 0 \Rightarrow (x-6)(x+2) = 0 \Rightarrow$ ریشه ها: $\frac{9}{4}$ و $-\frac{1}{4} \rightarrow \boxed{\frac{9}{4} \text{ و } -\frac{1}{4}}$

د) $2x^2 - 5x - 12 = 0 \Rightarrow x^2 - 5x - 12 = 0 \Rightarrow (x-8)(x+3) = 0 \Rightarrow$ ریشه ها: $\frac{1}{2}$ و $-\frac{3}{2} \rightarrow \boxed{\frac{1}{2} \text{ و } -\frac{3}{2}}$

الف) $x^2 - 5x - 12 = 0 \Rightarrow (x-7)(x+2) = 0 \Rightarrow$ ریشه ها: $\boxed{7 \text{ و } -2}$

ب) $2x^2 + 5x + 3 = 0 \xrightarrow{a+c=b} \text{ ریشه ها: } -1 \text{ و } -\frac{3}{2} \rightarrow \boxed{-1 \text{ و } -\frac{3}{2}}$

ج) $x^2 + 2x + 3 = 0 \xrightarrow{\Delta} \Delta = b^2 - 4ac = (2)^2 + (-4 \times 3 \times 1) = 4 - 12 = -8 \Rightarrow \Delta < 0 \Rightarrow$ ریشه ها: $\text{ریشه ها حقیقی ندارد}$

د) $3x^2 + 2x - 2 = 0 \xrightarrow{\Delta = b^2 - 4ac} \Delta = (2)^2 + (-4 \times 3 \times -2) = 4 + 24 = 28 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-2 \pm \sqrt{28}}{6} \rightarrow$ ریشه ها: $\boxed{\frac{-2 \pm \sqrt{28}}{6}}$

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

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

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

الف) $F(n) = \{(1, m^2), (2, 1), (-3, m), (-2, m), (3, m+2), (m, 4)\}$. $m^2 = m+2 \Rightarrow m^2 - m + 2 = 0$

ریشه ها: $\frac{1}{2}$ و $-\frac{3}{2}$ $\xrightarrow{\text{اگر } m=1 \text{ یا } m=-3 \text{ یا } m=-2 \text{ یا } m=3 \text{ یا } m=4 \text{ یا } m=m^2}$ $\Rightarrow$ ریشه ها: $\frac{1}{2}$ و $-\frac{3}{2}$

ب) $g(n) = \{(1, m^2), (2, 1), (m, 4), (3, m+2), (-2, m), (-1, 3)\}$ $m^2 = m+2 \Rightarrow m^2 - m + 2 = 0$

ریشه ها: $\frac{1}{2}$ و $-\frac{3}{2}$ $\xrightarrow{\text{اگر } m=1 \text{ یا } m=-3 \text{ یا } m=-2 \text{ یا } m=3 \text{ یا } m=4 \text{ یا } m=m^2}$ $\Rightarrow$ ریشه ها: $\frac{1}{2}$ و $-\frac{3}{2}$

$F(n) = \{(1, a^2), (1, 3a-2), (a^2, 3a+2)\}$

$a^2 = 3a-2 \Rightarrow -a^2 + 3a - 2 = 0 \xrightarrow{a+b+c=0} \text{ ریشه ها: } 1 \text{ و } 2 \xrightarrow{\text{اگر } a=1} a^2 \times 3a+2$

$\Rightarrow \text{اگر } a=1 \rightarrow \text{ریشه ها: } 1 \text{ و } 2 \Rightarrow$ ریشه ها: $\boxed{1 \text{ و } 2}$

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

$x^2 - 1 = ax + b$ if $x = 1 \rightarrow (1)^2 - 1 = a(1) + b \Rightarrow a = -b$
 $x^2 = ax + b$ if $x = 2 \rightarrow (2)^2 = a(2) + b \Rightarrow 4 = 2a + b \Rightarrow 4 = 2(-a) - a \Rightarrow 4 = -3a \Rightarrow a = -\frac{4}{3}$
 $b = -a = \frac{4}{3}$

$$a \times b = -\frac{4}{3} \times \frac{4}{3} = -\frac{16}{9}$$

$$f(x) = \begin{cases} 2x - 3 & x \geq k \\ 4 - 2x & x < k \end{cases}$$

$2x - 3 = 4 - 2x$ if $x = k \rightarrow 2(k) - 3 = 4 - 2(k) \Rightarrow 4k = 7 \Rightarrow k = \frac{7}{4}$

الف) $y'' - 4y = x^2 - 4x + 3$ if $x = 1 \rightarrow y'' - 4y = (1)^2 - 4(1) + 3 \Rightarrow y'' - 4y = 0 \Rightarrow y(y'' - 4) = 0$
 $\Rightarrow y = 0$ or $y = \pm \sqrt{4}$ تابع

ب) $|x| + |y| = 3$ if $x = 1 \rightarrow |1| + |y| = 3 \Rightarrow |y| = 2 \Rightarrow y = \pm 2$ تابع

ج) $|y| = \sqrt{1 - \cos x}$ if $\cos x = 0 \rightarrow |y| = \sqrt{1 - 1} = 0 \Rightarrow y = 0$ تابع

د) $y'' + x^2 + 2x + 1 = 0 \Rightarrow y'' + (x+1)^2 = 0$ if $x = -1 \rightarrow y'' = 0 \Rightarrow y = 0$ تابع

الف) $\sqrt[3]{y} + x^2 = 2x - 2 \Rightarrow \sqrt[3]{y_1} = -x_1^2 + 2x_1 - 1$ if $x_1 = x_2 \rightarrow \sqrt[3]{y_1} = \sqrt[3]{y_2} \Rightarrow y_1 = y_2$ تابع

ب) $y'' + 2y = \Delta x \Rightarrow \begin{cases} y_1'' + 2y_1 = \Delta x_1 \\ y_2'' + 2y_2 = \Delta x_2 \end{cases}$ if $x_1 = x_2 \rightarrow y_1'' + 2y_1 = y_2'' + 2y_2 \Rightarrow y_1'' - y_2'' + 2y_1 - 2y_2 = 0$

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

$y_1 - y_2 = 0 \Rightarrow y_1 = y_2$ تابع

الف) $x \sin y = y \sin x$ if $x = 0 \rightarrow 0 \sin y = y \sin 0 \Rightarrow y = 0, \sqrt{2}, 2, \sqrt{3}, \dots$ تابع

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

$z = 1 \Rightarrow \sqrt{\frac{x}{y}} = 1 \Rightarrow \frac{x}{y} = 1 \Rightarrow x = y$ تابع

$$\text{ج-۴)} \quad (3, n^2) \text{ و } (3, n+2) \leadsto n^2 = n+2 \leadsto n^2 - n - 2 = 0.$$

$$n=2 \rightarrow (2, 1) \text{ و } (2, 4) \quad \times$$

$$n=-1 \rightarrow (-1, 4) \text{ و } (-1, 3) \quad \times$$

به ازای هیچ مقدار n عبارت آیزنیت!