

الف) $4x^2 - 4x - 4 = 0$ $x^2 - x - 1 = 0$ $(x-2)(x+1) = 0$ $x = 2, -1$ ب) $3x^2 - 18x + 12 = 0$ $x^2 - 6x + 4 = 0$ $(x-2)(x-4) = 0$ $x = 2, 4$	ج) $4x^2 - 4x - 4 = 0$ $x^2 - x - 1 = 0$ $(x-2)(x+1) = 0$ $x = 2, -1$ د) $2x^2 - 4x - 12 = 0$ $x^2 - 2x - 6 = 0$ $(x-4)(x+2) = 0$ $x = 4, -2$	1
الف) $x^2 - 5x - 14 = 0$ $(x-7)(x+2) = 0$ $x = 7, -2$ ب) $2x^2 + 5x + 3 = 0$ $x^2 + 2.5x + 1.5 = 0$ $(x+1)(x+1.5) = 0$ $x = -1, -1.5$	ج) $x^2 + 2x + 3 = 0$ $\Delta = b^2 - 4ac$ $\Delta = (2)^2 - 4(1)(3) = -8$ $\Delta < 0 \Rightarrow$ معادله ریشه ندارد د) $3x^2 + 3x - 2 = 0$ $\Delta = b^2 - 4ac$ $\Delta = (3)^2 - 4(3)(-2) = 45$ $x = \frac{-3 \pm \sqrt{45}}{6}$ $x = \frac{-3 + 3\sqrt{5}}{6}$ $x = \frac{-3 - 3\sqrt{5}}{6}$	2
$A = \{1, 2, 3\} \rightarrow$ عضو $B = \{2, 3\} \rightarrow$ عضو $A \times B - B^c = \{ (1,2), (1,3), (2,2), (2,3), (3,2), (3,3) \} - \{ (2,2), (2,3), (3,2), (3,3) \} = \{ (1,2), (1,3) \}$ $n(A \times B) - n(B^c) = n(A) \times n(B) - n(B) \times n(B) \rightarrow (3 \times 2) - (2 \times 2) = 2$		3
$f(m) = \{ (3, m^2), (2, 1), (-3, m), (-2, m), (3, m+2), (m, 4) \}$ $(3, m^2) = (3, m+2) \rightarrow m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \rightarrow a+c=b \rightarrow m = -1, m = 2$ $g(m) = \{ (3, m^2), (2, 1), (m, 4), (3, m+2), (-2, m), (-1, 3) \}$ $(3, m^2) = (3, m+2) \rightarrow m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \rightarrow a+c=b \rightarrow m = -1, m = 2$	$m = -1 \rightarrow (-3, m) = (-3, -1) \neq (-2, m) \times$ $m = 2 \rightarrow (-2, m) = (-2, 2) \neq (-1, 3) \times$ $m = -1 \rightarrow (3, m+2) = (3, 1) \neq (2, 1) \times$ $m = 2 \rightarrow (3, m+2) = (3, 4) \neq (m, 4) \times$ توجه: نسبت به ازای هیچ مقولای از m	4
$f(a) = \{ (1, a^2), (1, 3a-2), (a^2, 3a+2) \}$ $(1, a^2) = (1, 3a-2) \rightarrow a^2 = 3a-2 \rightarrow a^2 - 3a + 2 = 0 \rightarrow a+b+c \rightarrow a = 1, a = 2$	$a = 1 \rightarrow (1, a^2) = (1, 1) \neq (1, 4) \times$ $a = 2 \rightarrow (1, a^2) = (1, 4) \neq (4, 8) \times$	5

$f(x) = \begin{cases} x^2 - 1 & x < 1 \\ ax + b & 1 \leq x \leq 2 \\ x^3 & x > 2 \end{cases}$	① $x=1 \rightarrow x^2 - 1 = a(1) + b$ ② $x=2 \rightarrow a(2) + b = 2^3$ ① $(1)^2 - 1 = a(1) + b$ $0 = a + b$ ② $a(2) + b = (2)^3$ $2a + b = 8$	①, ② $\begin{cases} (a+b=0) \times -1 \\ 2a+b=8 \end{cases}$ $\begin{cases} -a-b=0 \\ 2a+b=8 \end{cases}$ $3a=8$ $a=\frac{8}{3}$ $b=-\frac{8}{3}$ $a \times b = \frac{8}{3} \times -\frac{8}{3} = -\frac{64}{9}$
$f(x) = \begin{cases} 2x - 3 & x > 4 \\ 4 - 3x & x < 4 \end{cases}$	$x=4 \rightarrow 2x - 3 = 4 - 3x$ $2(4) - 3 = 4 - 3(4)$ $8 - 3 = 4 - 12$ $5 = -8$ $13 = 0$	۶
الف) $y^3 - 4y = x^2 - 4x + 3$ $\times$ $x=3 \rightarrow y^3 - 4y = 3^2 - 4(3) + 3$ $y^3 - 4y = 9 - 12 + 3$ $y^3 - 4y = 0$ $y(y^2 - 4) = 0 \rightarrow y=0$ یا $y=\pm 2$ ب) $x + y = 3$ $\times$ $x=1 \rightarrow 1 + y = 3$ $y = 2$ $y = \pm 2$	ب) $y = \sqrt{1 - \cos x}$ $\times$ $1 - \cos x > 0 \Rightarrow 1 > \cos x$ $1 - \cos x > 0$ همیشه برقرار است $x=0 \rightarrow y = \sqrt{1 - 1}$ $y = 0 \rightarrow y = 0$ ج) $y^2 + x^2 + 2x + 1 = 0$ $y^2 + (x+1)^2 = 0 \Rightarrow (x+1)^2 = 0 \Rightarrow x = -1$	مثال نقض ۱
الف) $\sqrt[3]{y} + x^2 = 2x - 2$ $\checkmark$ $x_1 = x_2 \Rightarrow y_1 = y_2$ $\sqrt[3]{y_1} = -x_1^2 + 2x_1 - 2$ $\sqrt[3]{y_2} = -x_2^2 + 2x_2 - 2$ $\sqrt[3]{y_1} = \sqrt[3]{y_2}$ $y_1 = y_2$ $\checkmark$	ب) $y^3 + 2y = 5x$ $\checkmark$ $x_1 = x_2 \Rightarrow y_1 = y_2$ $y_1^3 + 2y_1 = 5x_1$ $y_2^3 + 2y_2 = 5x_2$ $y_1^3 + 2y_1 = y_2^3 + 2y_2$ $y_1^3 - y_2^3 + 2y_1 - 2y_2 = 0$ $(y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2) + 2(y_1 - y_2) = 0$	۴۵
الف) $x \sin y = y \sin x$ $\times$ $x=\pi \rightarrow \pi \sin y = y \sin(\pi)$ $\pi \sin y = 0 \Rightarrow y = \pi$ مثال نقض ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2$ $\checkmark$ $\frac{x}{y} + \frac{y}{x} + 2\sqrt{\frac{xy}{xy}} = 4$ $\frac{x}{y} + \frac{y}{x} + 2 = 4$ $\frac{x}{y} + \frac{y}{x} = 2$ $\frac{x^2 + y^2}{xy} = 2$ $x^2 + y^2 = 2xy \rightarrow x^2 - 2xy + y^2 = 0 \Rightarrow (x-y)^2 = 0 \rightarrow x-y=0$ $x=y$	۱۰	۱۰