

الف) $4x^2 - 5x - 4 = 0 \Rightarrow x^2 - 5x - 4 = 0 \Rightarrow (x-1)(x+4) = 0 \Rightarrow x = \frac{1}{4}, x = -\frac{4}{5}$
 ب) $3x^2 - 8x - 4 = 0 \Rightarrow x^2 - 8x - 4 = 0 \Rightarrow (x-1)(x+1) = 0 \Rightarrow x = \frac{1}{3}, x = -\frac{1}{2}$
 ج) $2x^2 - 3x - 12 = 0 \Rightarrow x^2 - 3x - 12 = 0 \Rightarrow (x-4)(x+3) = 0 \Rightarrow x = \frac{4}{2}, x = -\frac{3}{2}$
 د) $2x^2 - 5x - 12 = 0 \Rightarrow x^2 - 5x - 12 = 0 \Rightarrow (x-1)(x+12) = 0 \Rightarrow x = \frac{1}{2}, x = -\frac{12}{5}$

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الف) $x^2 - 5x - 12 = 0 \Rightarrow (x-7)(x+4) \Rightarrow x = 7, x = -4$
 ب) $2x^2 + 5x + 4 = 0 \Rightarrow x^2 + 5x + 4 = 0 \Rightarrow (x+1)(x+4) \Rightarrow x = -\frac{1}{2}, x = -\frac{4}{2}$
 ج) $x^2 + 2x + 4 = 0 \Rightarrow \Delta = 4 - 4(1)(4) < 0 \Rightarrow$ ریشه ندارد!
 د) $2x^2 + 5x - 4 = 0 \Rightarrow x^2 + 5x - 4 = 0 \Rightarrow \Delta = 9 + 16 = 25 \Rightarrow x = \frac{-5 \pm \sqrt{25}}{2}$

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

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الف) $f(x) = \{(x, m^2), (x, 1), (-x, m), (-x, m), (x, m+x), (m, x)\}$
 $m+x = m^2 \Rightarrow m^2 - m - x = 0 \Rightarrow m = -1 \checkmark$
 $m = 2$ غلط
 ب) $g(x) = \{(x, m^2), (x, 1), (m, x), (x, m+x), (-x, m), (-1, x)\}$
 $m^2 = m+x \Rightarrow m^2 - m - x = 0 \Rightarrow m = -1 \checkmark$
 $m = 2$ غلط

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$f(x) = \{(x, x^2), (x, x-1), (x^2, x+x)\}$
 $x^2 = x+x-1 \Rightarrow x^2 - 2x + 1 = 0 \Rightarrow x = 1 \checkmark$
 $x = 2 \checkmark$

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$f(x) = \begin{cases} x^x - 1 & x \leq 1 \Rightarrow x = 1 : 1 - 1 = 0 \\ ax + b & 1 \leq x \leq 2 \Rightarrow x = 1 : a + b \Rightarrow x = 2 : a + b \\ x^x & x \geq 2 \Rightarrow x = 2 : 2 = 1 \end{cases}$ $\Rightarrow \begin{cases} a + b = 0 \\ 2a + b = 1 \end{cases} \Rightarrow \begin{cases} a = 1 \\ b = -1 \end{cases}$	6
$f(x) = \begin{cases} x^x - x & x \geq k \quad x = k : x^x - x \\ x - x^x & x \leq k \quad x = k : x - x^x \end{cases}$ $\Rightarrow x - x^x = x^x - x \Rightarrow 2x^x = 2x \Rightarrow x^x = x \Rightarrow k = \frac{x}{x}$	7
ا) $y^x - 4y = x^x - 4x + 4 \quad x=0 : y(y^x - 4) = 0 \Rightarrow y = 4, y = 0$ <i>مطلوب</i> ب) $x + y = 3 \quad x=0 : y = 3 \Rightarrow y = \pm 3$ <i>مطلوب</i> ج) $y = \sqrt{1 - \cos x} \quad x = \frac{\pi}{2} \Rightarrow y = \sqrt{1 - 1} \Rightarrow y = 0 \Rightarrow y = 0$ <i>مطلوب</i> د) $y^x + x^x + x + 1 = 0 \Rightarrow y^x + (x+1)^x = 0$ <i>مطلوب</i>	8
ا) $\sqrt{y^x} + x^x = x^x - x \quad x_1, y_1 \in f \text{ if } x_1 = x_2 \Rightarrow y_1 = y_2$ ب) $\sqrt{y^x} = -x^x + x^x - x, \sqrt{y^x} = -x^x + x^x - x \Rightarrow \sqrt{y^x} = \sqrt{y^x} \Rightarrow y^x = y^x \Rightarrow y = y$ <i>مطلوب</i> ج) $y^x + x^x = ax \quad x_1, y_1 \in f \text{ if } x_1 = x_2 \Rightarrow y_1 = y_2$ د) $y^x + x^x = y^x + x^x \Rightarrow (y_1 - y_2)(y_1^x + y_2^x + y_1^x) = -x(y_1 - y_2) = (y_1 - y_2)(y_1^x + y_2^x + y_1^x + x) = 0$	9
ا) $x \sin y = y \sin x \Rightarrow x=0 : 0 \sin y = y \sin 0 \Rightarrow y = 0$ <i>مطلوب</i> ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \Rightarrow \frac{x}{y} + \frac{y}{x} + 2 = 2 \Rightarrow \frac{x}{y} + \frac{y}{x} = 0$ <i>مطلوب</i> ج) $\frac{x^x + y^x}{xy} = 2 \Rightarrow x^x + y^x = 2xy \Rightarrow x^x + y^x - 2xy = 0 \Rightarrow (x-y)^x = 0 \Rightarrow y = x$ <i>مطلوب</i>	10

$\Rightarrow y_1 = y_2$ *مطلوب*