

1) $3x^2 - 11x - 4 = 0 \Rightarrow x^2 - 11x - 4 = 0$ (ب)
 $(x-4)(x+1) = 0 \Rightarrow x = \frac{4}{1}, -\frac{1}{1}$
 $\Rightarrow \boxed{x = 4, -1}$

الف) $4x^2 - 8x - 4 = 0 \Rightarrow x^2 - 2x - 1 = 0$
 $(x-4)(x+1) = 0 \Rightarrow x = \frac{4}{1}, -\frac{1}{1} = \boxed{\frac{4}{1}, -\frac{1}{1}}$

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

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

3) $2x^2 + 5x + 2 = 0$ (ب)
 $a+c = 7 \Rightarrow 2+5 = 7 \Rightarrow \boxed{x = -1, -\frac{2}{1}}$

الف) $x^2 - 5x - 12 = 0$
 $(x-7)(x+2) = 0 \Rightarrow \boxed{x = 7, -2}$

4) $2x^2 + 5x - 2 = 0$ (ب)
 $\Delta = b^2 - 4ac = 25 - 4(2)(-2) = 25 + 16 = 41$
 $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-5 \pm \sqrt{41}}{4}$

ج) $x^2 + 2x + 3 = 0$ (ب)
 $\Delta = b^2 - 4ac = 4 - 4(1)(3) = -8$
 $\Rightarrow \Delta < 0 \Rightarrow$ ریشه ندارد

5) $A = \{1, 2, 3\}, B = \{2, 4\} \quad A \times B - B^2 = ?$
 $\{(1,2), (1,4), (2,2), (2,4), (3,2), (3,4)\} - \{(2,2), (2,4), (4,2), (4,4)\} =$
 $\boxed{\{(1,2), (1,4)\}} = A \times B - B^2$

6) الف) $f(x) = \{(x, m^2), (2, 1), (-3, m), (-2, m), (x^2, m+2), (m, 2)\}$
 $(x, m^2) = (x, m+2) \Rightarrow m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow m = -1, 2$
 $\begin{cases} m = -1 \Rightarrow \{(2, 1), (2, 1), (-3, -1), (-2, -1), (x, 1), (-1, 2)\} \checkmark \\ m = 2 \Rightarrow \{(x, 4), (2, 1), (-3, 2), (-2, 2), (x, 2), (2, 2)\} \checkmark \end{cases} \Rightarrow \boxed{m = -1}$

ب) $g(x) = \{(x, m^2), (2, 1), (m, 2), (x^2, m+2), (-2, m), (-1, 2)\}$
 $m^2 = m+2 \Rightarrow m < -1 \rightarrow \{(x, 2), (-1, 2), (-1, 2)\} \checkmark$
 $m > 2 \rightarrow \{(x, 2), (2, 1)\} \checkmark \Rightarrow \boxed{X \text{ برای } m \text{ هیچ جوابی ندارد}}$

7) $f(m) = \{(1, a^2), (1, 3a-2), (a^2, 3a+2)\}$
 $a^2 = 3a-2 \Rightarrow a^2 - 3a + 2 = 0 \Rightarrow a = 1, 2$
 $\begin{cases} a = 1 \Rightarrow \{(1, 1), (1, 1), (1, 5)\} \checkmark \rightarrow X \text{ صحیح} \\ a = 2 \Rightarrow \{(1, 4), (1, 4), (4, 8)\} \checkmark \rightarrow \boxed{a = 2} \end{cases}$

$f(n) = \begin{cases} n^2 - 1 & n \leq 1 \\ an + b & 1 < n \leq r \\ n^n & n \geq r \end{cases}$ بازتابی و بازتابی نیست $\Rightarrow n=1 \Rightarrow n^2 - 1 = an + b \Rightarrow 1 - 1 = a + b \Rightarrow a + b = 0$ $\Rightarrow n=2 \Rightarrow an + b = n^n \Rightarrow 2a + b = 1$ $\left. \begin{aligned} a + b &= 0 \\ 2a + b &= 1 \end{aligned} \right\} \Rightarrow \begin{aligned} a + a + b &= 1 \\ \Rightarrow a + 0 &= 1 \Rightarrow a = 1 \\ \Rightarrow a = 1 \Rightarrow b &= -1 \end{aligned}$ $axb = -4E$	6
$f(n) = \begin{cases} 2n - n^2 & n \geq K \\ \varepsilon - 2n & n \leq K \end{cases}$ $\Rightarrow n=K \Rightarrow 2K - K^2 = \varepsilon - 2K \Rightarrow 4K = \varepsilon \Rightarrow K = \frac{\varepsilon}{4}$ از آنجا که در این عبارت یک تابع است پس برای $n=K$ باید خود متاهل باشد (محور دایره ای هر دو برابر)	7
الف) $y^2 - 4y = n^2 - \varepsilon n + \varepsilon$ $\Rightarrow y^2 - 4y + 4 = n^2 - \varepsilon n + \varepsilon + 4$ $\Rightarrow (y-2)^2 = n^2 - \varepsilon n + \varepsilon + 4$ $\Rightarrow$ تابع نیست ب) $n + y = 3 \rightarrow n=0 \Rightarrow y =3 \Rightarrow y=3$ $\Rightarrow$ تابع نیست ج) $y = \sqrt{1 - \cos x} \rightarrow x=90^\circ \Rightarrow y =1 \Rightarrow y=\pm 1$ $\Rightarrow$ تابع نیست د) $y^2 + n^2 + 2n + 1 = 0 \Rightarrow y^2 + (n+1)^2 = 0 \Rightarrow y=0, n=-1$ $\Rightarrow$ تابع نیست	8
الف) $\sqrt{y} + n^2 = 2n^2 - 2 \Rightarrow \sqrt{y} = n^2 - 2 \Rightarrow y = n^4 - 4n^2 + 4$ $\Rightarrow$ تابع نیست ب) $y^2 + 2y = an$ $\Rightarrow y^2 + 2y + 1 = an + 1 \Rightarrow (y+1)^2 = an + 1$ $\Rightarrow y+1 = \pm \sqrt{an+1}$ $\Rightarrow y = -1 \pm \sqrt{an+1}$ $\Rightarrow$ تابع نیست ج) $(y_1 - y_2) (y_1^2 + y_1 y_2 + y_2^2 + 2) = 0$ $\Rightarrow y_1 = y_2$ $\Rightarrow$ تابع نیست	9
الف) $x \sin y = y \sin x \Rightarrow x=0 \Rightarrow y \sin 0 = 0 \Rightarrow y=0$ $\Rightarrow$ تابع نیست X	10
ب) $\sqrt{\frac{n}{y}} + \sqrt{\frac{y}{n}} = 2 \Rightarrow \frac{n}{y} + \frac{y}{n} + 2 = 4 \Rightarrow \frac{n}{y} + \frac{y}{n} = 2$ $\Rightarrow (y-n)^2 = 0 \Rightarrow y=n$ $\Rightarrow$ تابع نیست	