

الف) $y^3 = 2x^2 + 2x - 1$ $\xrightarrow{\text{تعیین ریاضی}} y_1^3 = y_2^3 \rightarrow y_1 = y_2$ تابع است ✓

ب) $x = \frac{\pi}{4} \rightarrow \cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} \rightarrow y = \frac{\pi}{4}$ و $\frac{3\pi}{4}$ و $\frac{5\pi}{4}$ و ... تابع نیست ✓

ج) $(x+y)^2 = 4xy \rightarrow x^2 + 2xy + y^2 = 4xy \rightarrow x^2 - 2xy + y^2 = 0 \rightarrow (x-y)^2 = 0 \rightarrow x=y$ تابع است ✓

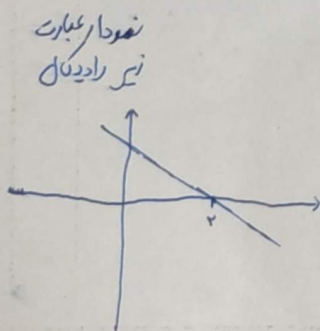
د) $x(y^2+1) - y(y^2+1) = 0 \rightarrow (x-y)(y^2+1) = 0 \rightarrow y^2+1 > 0 \rightarrow x-y=0 \rightarrow x=y$ تابع است ✓

الف) $\rightarrow y \geq 0 \rightarrow y+x^2 = 2y \rightarrow y = x^2$
 $\rightarrow y < 0 \rightarrow -y+x^2 = 2y \rightarrow y = \frac{x^2}{3}$ تابع است ✓

ب) $x=0 \rightarrow [y]=1 \rightarrow y \in [1, 2) \rightarrow$ تابع نیست ✓

الف) $f(x) = \begin{cases} x^2 - b & x \geq 3 \\ a + 2x & 0 \leq x < 3 \\ x^2 - b & x < -1 \end{cases}$ $\xrightarrow{x=3} 1 - b = a + 6 \rightarrow a + b = 12$ ✓

الف) a, b $\Rightarrow a - bx - x^2 = -(x-a)(x-b)$
 $\Rightarrow a + b = -b \rightarrow a = -2b$
 $\Rightarrow a + b = 1$ ✓



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$r+b=0 \rightarrow b=-r \rightarrow \begin{array}{l} \text{باید صورت برابر باشد} \\ \text{به این صورت باشد} \end{array} \rightarrow \frac{\lambda}{x-r} \rightarrow \frac{r_{x+r}}{x-r} + \alpha = \frac{r_{x+r} + \alpha(x-r)}{x-r} \xrightarrow{\text{ضرب کنیم}} \frac{r_{x+r} + \alpha(x-r)}{x-r} \xrightarrow{\text{باید صاف باشد}} r + \alpha = 0$ $\alpha = -r \rightarrow \frac{r_{x+r}}{x-r} - r = \frac{\lambda}{x-r} \geq 0 \rightarrow x > r \rightarrow \boxed{b = -r} \checkmark$	۲
الف) $x^2 - x \geq 0 \rightarrow x(x-1) \geq 0$ $\begin{array}{c} -1 \quad 0 \quad 1 \\ \hline - \quad + \quad - \quad + \end{array} \rightarrow [-1, 0] \cup [1, +\infty) \checkmark$ ب) $x > 1 \rightarrow x > 1, x < -1 \checkmark$	۳
الف) $x \neq [x] \rightarrow \mathbb{R} - \{0, 1, 2, 3, \dots\} \checkmark \quad D = \mathbb{R} - \mathbb{N}$ ب) $x \geq 0, 9 - \sqrt{x} \geq 0 \rightarrow 9 \geq \sqrt{x} \rightarrow 81 \geq x \rightarrow 0 \leq x \leq 81 \checkmark$	۴
$\left[rx - \frac{1}{r}\right] + \left[rx + \frac{r}{r}\right] > 0 \rightarrow r \left[rx - \frac{1}{r}\right] + r > 0 \rightarrow \left[rx - \frac{1}{r}\right] > -1 \rightarrow \left[rx - \frac{1}{r}\right] \geq 0 \rightarrow rx \geq \frac{1}{r} \rightarrow x \geq \frac{1}{r} \checkmark$ $\downarrow$ $(rx - \frac{1}{r}) + r$ $D = [\frac{1}{r}, +\infty) \checkmark$	۵
$rx - a > 0, 1 - f(rx - a) \geq 0 \rightarrow f(rx - a) \leq 1 \rightarrow rx - a \leq 0 \rightarrow 0 < rx - a \leq 1 \rightarrow \frac{a}{r} < x \leq \frac{a+1}{r} \checkmark$ $(b, c] = \left(\frac{a}{r}, \frac{a+1}{r}\right] \rightarrow c - b = \omega \rightarrow \frac{a+1}{r} - \frac{a}{r} = \omega \checkmark$	۶