

- الف) $y_1^3 = 2x^2 + 2x - 1 \Rightarrow y_1^3 = y_2^3 \Rightarrow y_1 = y_2 \Rightarrow$ تابع است ✓
- ب) $x = \frac{\pi}{2} \Rightarrow \frac{\pi}{2} \cos y = y \cos \frac{\pi}{2} \Rightarrow \frac{\pi}{2} \cos y = 0 \Rightarrow y = \frac{\pi}{2}, \frac{3\pi}{2} \Rightarrow$ تابع نیست ✓
- ج) $x + y = 2\sqrt{xy} \Rightarrow (\sqrt{x} - \sqrt{y})^2 = 0 \Rightarrow \sqrt{x} = \sqrt{y} \Rightarrow x = y \Rightarrow$ تابع است ✓
- د) $x(y^2 + 2) - y(y^2 + 2) = 0 \Rightarrow (y^2 + 2)(x - y) = 0 \Rightarrow y^2 = -2$ غرض
 $x = y \Rightarrow$ تابع است ✓

- الف) $y \geq 0 \Rightarrow y = x^2$
 $y < 0 \Rightarrow x^2 = 3y$ غرض
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- $\Rightarrow$ تابع است ✓

- ب) $x = 1 \Rightarrow [y] = 0 \Rightarrow 1 > y \geq 0 \Rightarrow$ تابع نیست ✓

$$|x-1| \geq 2 \begin{cases} x-1 \geq 2 \Rightarrow x \geq 3 \\ x-1 \leq -2 \Rightarrow x \leq -1 \end{cases}$$

$$f(x) \begin{cases} 2x^2 - b & x \geq 3 \\ a + 2x & 0 \leq x \leq 3 \\ 2x^2 - b & x \leq -1 \end{cases} \xrightarrow{x=3} \begin{cases} 18 - b = a + 6 \\ a + b = 12 \end{cases} \checkmark$$

$$x = a \Rightarrow -a^2 - ab + a = 0 \Rightarrow -a(a+b-1) = 0 \Rightarrow \begin{cases} a = 0 \\ a+b=1 \end{cases} \checkmark$$

$$x = b \Rightarrow -b^2 - b^2 + a = 0 \Rightarrow a = 2b^2 \Rightarrow 2b^2 + b - 1 = 0 \Rightarrow b = -1 \Rightarrow a = 2$$

غرض $b = \frac{1}{2}$

$$a = 0 \checkmark$$

$$b < 0$$

$$x = 2 \Rightarrow 2b + c = 0 \Rightarrow c = -2b \checkmark$$

$$3a + c - 3|b| = 0 + 2b + 3b = b \checkmark$$

$$y = \sqrt{\frac{(a+3)x + ab + 2}{x+b}}$$

$$a = -3 \checkmark$$

$$1 + b = 0 \Rightarrow b = -1 \checkmark$$

الف) $x^2 - x \geq 0$
 $x(x-1)(x+1) \geq 0$ $D_f = [-1, 0] \cup [1, +\infty) \checkmark$

$$\begin{array}{c} -1 & 0 & 1 \\ - & + & - & + \end{array}$$

ب) $|x| - 1 > 0$
 $|x| > 1$
 $x > 1, x < -1$ $D_f' = (-\infty, -1) \cup (1, +\infty) \checkmark$

$$\text{الف) } |x| - [x] = 0 \quad \begin{cases} x \geq 0 \Rightarrow [x] = x \xrightarrow{x \in \mathbb{Z}} x = x \\ x < 0 \Rightarrow [x] = -x \xrightarrow{x \in \mathbb{Z}} x = 0 \Rightarrow x = 0 \end{cases}$$

(r) - 1

$$D_f = \mathbb{R} - \mathbb{N} \quad \checkmark$$

$$\text{ب) } x \geq 0 \quad \sqrt{y} = 9 - \sqrt{x}$$

$$D_f = [0, 81] \quad \checkmark$$

$$9 - \sqrt{x} \geq 0$$

$$\sqrt{x} \leq 9$$

$$x \leq 81$$

$$[rx - \frac{1}{r}] + [rx + \frac{w}{r}] - r + r > 0$$

$$D_f = [\frac{1}{r}, +\infty) \quad \checkmark$$

$$[rx - \frac{1}{r}] + [rx - \frac{1}{r}] > -r$$

$$r[rx - \frac{1}{r}] > -r$$

$$[rx - \frac{1}{r}] > -1$$

$$rx - \frac{1}{r} \geq 0$$

$$x \geq \frac{1}{r}$$

$$rx - a > 0$$

$$x > \frac{a}{r} = b$$

$$1 - \log(rx - a) \geq 0$$

$$\log(rx - a) \leq 1$$

$$c - b = a + \frac{a}{r} - \frac{a}{r} = \boxed{a} \quad \checkmark$$

$$rx - a \leq 10$$

$$x \leq \frac{10 + a}{r} = c$$

(r) - 10