

الف) $\left. \begin{aligned} y_1^3 - 2x^2 &= 2x - 1 \\ y_2^3 - 2x^2 &= 2x - 1 \end{aligned} \right\} y_1^3 = y_2^3 \Rightarrow$ تابع است

ب) $x = \frac{\pi}{2} \rightarrow \frac{\pi}{2} \cos y = 0 \Rightarrow \cos y = 0 \Rightarrow y = \frac{\pi}{2}, \frac{3\pi}{2}, \dots$ تابع نیست

ج) $\frac{x+y}{2} = \sqrt{xy} \Rightarrow x+y = 2\sqrt{xy} \Rightarrow (x+y)^2 = 4xy \Rightarrow (x-y)^2 = 0 \Rightarrow x=y$ تابع است

د) $y^3 + 2y^2 = 0 \Rightarrow$ تابع است

الف) $|y| + x^2 = 2y \Rightarrow \sqrt{y} = x \Rightarrow y = x^2$ تابع است
همواره مثبت $\Rightarrow$ همواره مثبت



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

$x=3 \Rightarrow 2x^2 - b = a + 2x \rightarrow 18 - b = a + 6 \Rightarrow a + b = 12$

$-x^2 - bx + a \geq 0 \rightarrow \frac{b}{-1} \frac{a}{-1}$

$a + b = -b \Rightarrow a = -2b$

$ab = -a \Rightarrow b = -1 \Rightarrow a = 2$

$\Rightarrow a + b = 2 + (-1) = 1$

$ax^2 + bx + c > 0 \quad \frac{2}{+3} -$

$\Rightarrow a = 0 \rightarrow bx + c = x - 2 \Rightarrow b = -1 \quad c = 2$

$\rightarrow 3a + c - 3|b| = 0 + 2 - 3 = -1$

$$\frac{3x+2}{x+b} + a > 0$$

$$x \neq -2 \Rightarrow b = -2$$

$$\text{الف) } x^3 - x \geq 0 \Rightarrow x(x^2 - 1) \geq 0$$

$$\frac{-1}{-1+1-1+} \Rightarrow D_f = [-1, 0] \cup [1, +\infty)$$

$$\text{ب) } |x| - 1 > 0 \Rightarrow |x| > 1 \Rightarrow D_f = (-\infty, -1) \cup (1, +\infty)$$

$$\text{الف) } |x| - [x] \neq 0 \Rightarrow |x| \neq [x] \Rightarrow D_f = \mathbb{R} - \mathbb{Z}^+$$

$$\text{ب) } \sqrt{x} = 9 - \sqrt{x} \Rightarrow 9 - \sqrt{x} \geq 0 \Rightarrow x \leq 81$$

$$\sqrt{x} + \sqrt{x} = 9 \Rightarrow D_f = [0, 81]$$

$$[2x - \frac{1}{x}] + [2x - \frac{1}{x} + 2] > 0 \Rightarrow 2[2x - \frac{1}{x}] + 2 > 0$$

$$\rightarrow 2[a] > -2 \Rightarrow [a] > -1 \Rightarrow a \geq 0$$

$$\Rightarrow 2x - \frac{1}{x} \geq 0 \Rightarrow 2x \geq \frac{1}{x} \Rightarrow x \geq \frac{1}{2}$$

$$D_f = [\frac{1}{2}, +\infty)$$

$$1 - \log(2x - a) \geq 0 \Rightarrow \log(2x - a) \leq 1 \Rightarrow 2x - a \leq 10$$

$$\Rightarrow x \leq \frac{10+a}{2} \quad (I)$$

$$2x - a > 0 \Rightarrow 2x > a \Rightarrow x > \frac{a}{2} \quad (II)$$

$$\underline{(I) \cap (II)} \quad [b, c] = \left(\frac{a}{2}, \frac{10+a}{2} \right] \quad c - b = \frac{10+a}{2} - \frac{a}{2} = 5$$