

$$f(x) = x^2 + 2x + 1 + 9x^2 - 4x + 1 + mx^2 + nx + mn$$

$$f(x) = (10+m)x^2 + (2-4+n)x + 2+mn$$

$$\left. \begin{array}{l} 10+m=0 \\ m=-10 \\ -2+n=0 \\ n=2 \end{array} \right\} g(x) = \{(f, -10)(f, p+1)(p+2, -1)(-9, p+k)\}$$

$$\left. \begin{array}{l} p+1=-10 \\ p=-11 \\ p+k=-1 \\ -11+k=-1 \\ k=10 \end{array} \right\} \begin{array}{l} m+n+p+k = \\ -10+2-11+10 \\ = -4 \end{array}$$

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

$$x-2=0 \rightarrow x=2$$

$$\begin{cases} x^2-2x-1=0 \\ (x-4)(x+2)=0 \end{cases} \rightarrow \begin{cases} x=2 \\ x=4 \\ x=-2 \end{cases}$$

$$\begin{array}{c} -2 \quad 2 \\ | \quad | \\ - \quad + \quad + \end{array} \quad (-2, +\infty) - \{2\}$$

(الف)

$$f-2[-x]=0$$

$$f=2[-x]$$

$$2=[-x] \rightarrow -3 < x \leq -2$$

$$R - (-3, 2]$$

(ب)

۲

$$x(x^2-1) \rightarrow -1 \quad 0 \quad +1 \quad \text{ریشه ها}$$

$$\begin{array}{c} -1 \quad 0 \quad +1 \\ | \quad | \quad | \\ - \quad + \quad - \quad + \end{array} \quad [-1, 0] \cup [1, +\infty)$$

$$|x|+x > 0 \rightarrow x \text{ صحیح است}$$

$$[1, +\infty) \text{ اشتراک}$$

$$|x|-1=0 \quad x \neq \pm 1 \quad (2)$$

$$|x-2|-x^2 \geq 0$$

$$x > 2 \rightarrow \begin{cases} -x^2+x-2 \geq 0 \\ x^2-x+2 \leq 0 \end{cases} \rightarrow \emptyset \quad \text{فاصله خالی}$$

$$x < 2 \rightarrow \begin{cases} -x^2-x+2 \geq 0 \\ x^2+x-2 \leq 0 \end{cases} \rightarrow \begin{array}{c} -2 \quad 1 \\ | \quad | \\ + \quad - \quad + \end{array} \quad (1)$$

$$(x+2)(x-1) \leq 0 \rightarrow \text{اشتراک} \rightarrow [-2, 1] - \{1\}$$

۳

$$||x-2|-1|-k=0$$

$$|x-2|-1=k$$

$$||x-2|-1|=k \rightarrow |x-2|-1=-k \rightarrow |x-2|=-k+1$$

$$\begin{cases} x-2=k+1 \\ x-2=-k-1 \end{cases} \quad (1)$$

$$\begin{cases} x-2=-k+1 \\ x-2=k-1 \end{cases} \quad (2)$$

$$(1) \rightarrow \text{مسوی}$$

$$k+1=-k-1$$

$$2k=-2$$

$$k=-1 \quad \text{فقط}$$

$$(2) \rightarrow \text{مسوی}$$

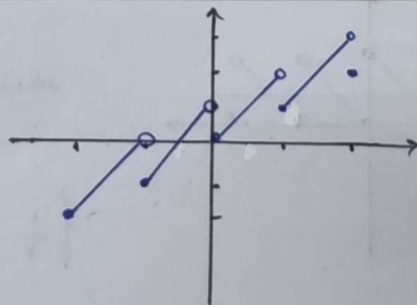
$$-k+1=k-1$$

$$2=2k$$

$$k=1 \quad \checkmark$$

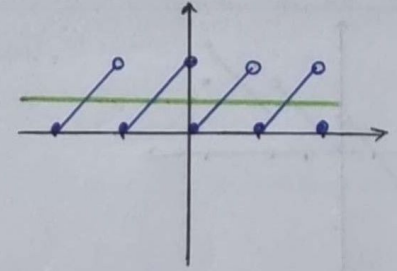
۴

$$2x - [x]$$



۵

فیض/کب

(جواب اول) $\frac{(x-4)(x-1)}{x+a} + b = x$ $\rightarrow \frac{(x-4)(x-1)}{x-1} + 4 = x$ $\rightarrow a = -1 \quad b = 4$ $a - b = -1 - 4 = -5$	(جواب دوم) $\frac{(x-4)(x-1)}{x+a} + b = x$ $\rightarrow \frac{(x-4)(x-1)}{x-4} + 1 = x$ $\rightarrow a = -4 \quad b = 1$ $a - b = -4 - 1 = -5$	6
$\frac{x^3 + 2x^2 - x - 2}{x^2 - 1} \xrightarrow{\text{تقسیم دورر}} x + 2 = x + c \rightarrow c = 2$ $f(1) = g(1) \Rightarrow \frac{a+2}{1+b} = 3 \rightarrow a+2 = 3+3b$ $f(-1) = g(-1) \Rightarrow \frac{-a+2}{-1+b} = 1 \rightarrow -a+2 = -1+b$ $\rightarrow a = 2, b = 0 \rightarrow b+c = 2+0 = 2$	$a+b = 3$ $a-3b = 1$	7
$D_g: b - 4x \geq 0$ $b \geq 4x$ $\frac{b}{4} \geq x$ $D_f: 5x - 3a \geq 0$ $5x \geq 3a$ $x \geq \frac{3}{5}a$ $\frac{3}{5}a \leq x \leq \frac{b}{4}$	(استفاده از شرط اول) : $\frac{b}{4} = 1 \rightarrow b = 4$ $\frac{3}{5}a = 1 \rightarrow a = \frac{5}{3}$ $2f(1) - g(1) = k$ $2(k-1) - 3k = k \rightarrow k = -1$ $2k - 2 - 3k = k$ $-2 = 2k$ $3a - \frac{b}{4} - k = ?$ $3(\frac{5}{3}) - \frac{4}{4} - (-1) =$ $5 - 1 + 1 = 5$	8
$D_f \cap D_g = [-1, 7]$ $D_g: 2x + 2 \geq 0$ $2x \geq -2$ $x \geq -1$ $D_f: m - x \geq 0$ $m \geq x$ $m = 7$	$f(x) - g(x) = 4\sqrt{2}$ $\sqrt{y-3} + n - \sqrt{1} = 4\sqrt{2}$ $y + n - 2\sqrt{2} = 4\sqrt{2}$ $n = 6\sqrt{2} - y$ $m + n = 6\sqrt{2} - y + 7 = 6\sqrt{2} + 7 - y$	9
$y = (-1)^x (x - [x]) = \frac{1}{2}$ $x - [x] = \frac{1}{2}$ $-2 \leq x \leq 2$	 با حفظ $y = \frac{1}{2}$ نقاط بی‌نهایت داریم ۴ جواب دارد! $\left\{ \frac{1}{2}, \frac{3}{2}, -\frac{1}{2}, -\frac{3}{2} \right\}$	10