

۱) $f(x) = x^2 + 1 + 2x + 9x^2 + 4 - 4x + mx^2 + nx + mn = (10+m)x^2 + (2+n)x + (5+mn)$
 $g(x) = (x-b) \cdot (x-p+1) \cdot (x+p+1) \cdot (x-p+k)$
 $m = -10 \Rightarrow 10 + m = 0$
 $n = 2 \Rightarrow 2 + n = 4$
 $-10 = p+1 \Rightarrow p = -11$
 $-1 = p+k \Rightarrow -1 = -11+k \Rightarrow k = 10$
 $mn + p + k = -10$

۲) $x^4 - 2x^2 - 1 = (x^2 - 1)(x^2 + 2) = 0$
 $\sqrt{\frac{x-2}{(x-2)(x+2)(x^2+2)}} = \frac{-2}{x^2+2} + \frac{2}{x^2+2}$
 $f - 2[-n] \neq 0 \Rightarrow f = 2[-n] \Rightarrow [-n] = 2 \Rightarrow -1 \leq n \leq 1$
 $D_f = \mathbb{R} - [-2, -1]$

۳) $x(x^2-1) = \frac{1}{x+1} + \frac{1}{x-1} + \frac{1}{x^2+1}$
 $D = (-1, 0) \cup (1, +\infty)$
 $D_f = (0, +\infty)$
 $|x| \neq 1 \Rightarrow x \neq \pm 1$
 $|x| \neq 1 \Rightarrow x \neq \pm 1$
 $D_f = (-2, -1)$

۴) این تابع $y = \frac{1}{|x-2|-1}$ را به دست آوریم
 $y = \frac{1}{|x-2|-1}$
 $k = 1$

۵) $g = \begin{cases} 2x-1 & 1 \leq x < 2 \\ 2x & 0 \leq x \leq 1 \\ 2x+1 & -1 \leq x < 0 \\ 2x+2 & -2 \leq x < -1 \end{cases}$

$$f(x) = \frac{x^2 - 4x + 4}{x + 1} + b = x \quad \Rightarrow \quad \frac{(x-2)(x-1)}{(x+1)} + b = x \Rightarrow \begin{matrix} a = -1, b = 1 \\ a = -1, b = 1 \end{matrix}$$

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

$$a - b = -1 - 1 = -2$$

$$\boxed{a - b = \{-2\}}$$

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$$f(x) = \left\{ \frac{x^2 + 2x - 1}{x - 1} = x + 1 \Rightarrow g(x) = x + 1 \Rightarrow \boxed{c = 1} \right.$$

$$x = 1 \Rightarrow \frac{a + 1}{1 + b} = 1 \Rightarrow a + 1 = 1 + b \Rightarrow a = b$$

$$\boxed{b + c = 1 - 1 = 0}$$

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$$x = -1 \Rightarrow \frac{a + 1}{1 + b} = 1 \Rightarrow 1 + b = a + 1$$

$$a + b = 1 + b \Rightarrow a = 1 \Rightarrow \boxed{a = 1}$$

$$\sqrt{b - 1} + k = \sqrt{b - 1} + k = k$$

$$\Rightarrow b - 1 = b \Rightarrow \boxed{a = 1} \quad b - 1 = 0 \Rightarrow \boxed{b = 1}$$

$$\begin{matrix} a - b = k \\ b - 1 = 1 \end{matrix} \Rightarrow \boxed{a = 1}$$

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$$f(x) - g(x) = 4 \Rightarrow f(x) = 4 + g(x)$$

$$f(x) = \sqrt{x - 1} + 1$$

$$1 + x = 4 + \sqrt{x - 1}$$

$$x + 1 \geq 0 \Rightarrow x \geq -1$$

$$m = x \geq 0 \Rightarrow x \geq 0$$

$$x \geq 0$$

$$1 + x = 4 + \sqrt{x - 1}$$

$$\Rightarrow m = 4 + \sqrt{x - 1}$$

$$m + n = 4 + \sqrt{x - 1} + \sqrt{x - 1} = \boxed{4 + 2\sqrt{x - 1}}$$

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$$y = x - [x]$$

$$\begin{matrix} 0.9999 \\ 0.9999 \\ 0.9999 \\ 0.9999 \\ 0.9999 \end{matrix}$$

$$y = x - [x] = \frac{1}{2} \quad D[-1, 1]$$

$$\begin{matrix} 0.9999 \\ 0.9999 \\ 0.9999 \\ 0.9999 \\ 0.9999 \end{matrix}$$

$$\boxed{-1, 1}$$

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