

$f(x) \geq x-1$ $f(x) = \begin{cases} 2x-1, & x \geq 1 \\ 5x+3, & x < 1 \end{cases}$ $2x-1 \geq x-1 \rightarrow x \geq 0 \xrightarrow{x \geq 1} \text{I: } \boxed{x \geq 1}$ $5x+3 \geq x-1 \rightarrow x \geq -\frac{4}{4} \xrightarrow{x < 1} \text{II: } \boxed{-\frac{4}{4} \leq x < 1}$ $\text{I} \cap \text{II} \rightarrow D_f = \left[-\frac{4}{4} + \infty\right)$	۱
$y = \frac{2x^2 + 3x + 1}{(x^2 + 5x + 1)^2} = \frac{2(1x^2 + 1.5x + 1)}{(x^2 + 1)^2} = \frac{2(2x+1)^2}{(2x+1)^2} = \frac{2}{2x+1}$ $2x+1 \neq 0 \quad x \neq -\frac{1}{2} \quad D_f = \mathbb{R} - \left\{-\frac{1}{2}\right\}$	۲
$\frac{x^2 + 5x - 6}{x^2 - 1} = \frac{(x+6)(x-1)}{(x-1)(x+1)} = x+6 \rightarrow \boxed{C=6}$ $\frac{x=1}{\rightarrow} \quad 1 = \frac{a+1}{1+b} \Rightarrow 1+b = a+1 \rightarrow a = b$ $\frac{x=-1}{\rightarrow} \quad -1 = \frac{-a+1}{-1+b} \Rightarrow -1+b = -a+1 \rightarrow a = 2-b$ $b = \frac{1}{2} \rightarrow a = \frac{1}{2}$ $C+b = 6.5$	۳
$\frac{(x+1)(x-1)}{x^2 + ax + b} = \frac{x+1}{x-c}$ $\frac{(x+1)(x-1)}{(x-1)^2} = \frac{x+1}{x-1} \Rightarrow \begin{cases} a = -2 \\ b = 1 \\ c = 1 \end{cases}$ $D_f = D_g \rightarrow \text{دو تابع مساوی}$ $0 = a+b+c$	۴
$(x-2)^2(x) + (-x-2)^2(-x)$ $\xrightarrow{x+1=x} \quad \xrightarrow{1-x=x}$ $\Rightarrow (x^2 - 4x + 4)x - (x^2 + 4x + 4)x = -8x^2 = g(x)$	۵

$$\left. \begin{array}{l} 1-2x = -1 \rightarrow x=1 \xrightarrow{1>0} \sqrt{1} = 1 \\ 1-2x = 3 \rightarrow x=-1 \xrightarrow{-1<0} \sqrt{-1+1} = 1 \end{array} \right\} f(-1) + f(1) = \boxed{2} \checkmark$$

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$x + \sqrt{x} = 5 \rightarrow x = 4 \rightarrow \sqrt{x} + 2(4) = 2\sqrt{4} + 12 = 2\sqrt{16}$

$(\sqrt{x})^2 = (4-x)^2$
 $x = 16 - 12x + x^2$
 $x^2 - 13x + 16 = 0 \rightarrow (x-1)(x-16)$
 $1+16 \neq 5$ $\textcircled{9}$ $\textcircled{16}$

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$$f(x-1) + f(1-x) = (1-x)^3 + (1-x) + \underbrace{(x-1)^3 + (x-1)}_{-(1-x)^3 - (1-x)} = \textcircled{0} \checkmark$$

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$f-g = \{(1, k)\} \xrightarrow{(1, k)} 1\sqrt{1-a} + 1\sqrt{k-1} - \sqrt{b-1} - \sqrt{k} = k$
 $0 - 1 - 0 = 1k \rightarrow \boxed{k=1}$

$b-1 \geq 0 \rightarrow \frac{b}{1} \geq x$
 $1-x-1 \geq 0 \rightarrow x \geq \frac{1}{1}$
 $x=1 = \frac{b}{1} = \frac{1a}{1}$
 $\rightarrow \boxed{b=1}, \boxed{a=\frac{1}{1}}$

$1a - \frac{b}{1} - k = 1 - 1 - 1 = -1$
 $= \textcircled{3} \checkmark$

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$D_{f \cap g} = D_f \cap D_g = [-1, 1]$
 $D_g = x \geq -1$
 $D_f = m \geq x$
 $\Rightarrow \boxed{m=1} \checkmark$

$f-g(1) = \sqrt{1-1} + 1 - \sqrt{1+1} = 1 - \sqrt{2} = 1 - \sqrt{1+1}$
 $\Rightarrow \boxed{1 - \sqrt{1+1}} \checkmark$
 $\Rightarrow \boxed{m+n = 1 - \sqrt{1+1}} \checkmark$

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