

$$1 - 2x = -1 \Rightarrow \boxed{x = 1} \Rightarrow f(-1) = 4\sqrt{1} = \boxed{4}$$

$$1 - 2x = 3 \Rightarrow \boxed{x = -1} \Rightarrow f(3) = \sqrt[3]{-1} + 2 = \boxed{1}$$

$$f(3) + f(-1) = 4 + 1 = \boxed{5}$$

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$$x + \sqrt{x} = 6 \Rightarrow \begin{matrix} t^2 + t - 6 = 0 \\ \sqrt{x} = t \end{matrix} \Rightarrow (t+3)(t-2) = 0$$

$$t = \sqrt{x} \begin{cases} \leftarrow t = -3 \text{ غایب} \\ \leftarrow t = 2 \Rightarrow \sqrt{x} = 2 \Rightarrow \boxed{x = 4} \end{cases}$$

$$x^4 + 3x = (4)^4 + 3(4) = 256 + 12 = \boxed{268}$$

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$$x - 1 \leq a, 1 - x \leq -a$$

$$f(a) + f(-a) = a^3 + a + (-a)^3 + (-a) = a^3 - a^3 + a - a = \boxed{0}$$

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$$2(f(1)) - (g(1)) = k \Rightarrow 2(\sqrt{4x-3a} + k - 1) - (\sqrt{b-4x} + 3k)$$

برای اینکه دامنه f و g تداخل داشته باشد، مسترک نباشد:

$$4x - 3a \geq 0 \Rightarrow x \geq \frac{3a}{4}, b - 4x \geq 0 \Rightarrow \frac{b}{4} \geq x, D_{f \cap g} = \left[\frac{3a}{4}, \frac{b}{4} \right]$$

$$\left. \begin{aligned} \frac{3a}{4} \geq 1 \rightarrow a \geq \frac{4}{3}, \frac{b}{4} \geq 1 \rightarrow b \geq 4 \\ 2f - g \Rightarrow 2k - 2 - 3k = k \rightarrow k = -1 \end{aligned} \right\} \begin{aligned} 3a - \frac{b}{2} - k, 3\left(\frac{4}{3}\right) - \left(\frac{4}{2}\right) - (-1) \\ \Rightarrow 4 - 2 + 1 = 3 \end{aligned}$$

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$$D_g = [-b, +\infty), D_f = (-\infty, m] \Rightarrow D_{f \cap g} = D_g \cap D_f = [-b, m] = [-b, 7]$$

$$\boxed{m = 7} \quad (f - g)(3) = 6\sqrt{2} \Rightarrow 2 + n - 2\sqrt{2} = 6\sqrt{2}$$

$$\boxed{n = 8\sqrt{2} - 2}$$

$$\boxed{m + n = 8\sqrt{2} + 5}$$

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