

$$x^3 + x = 2 \rightarrow x(x^2 + 1) = 2 \rightarrow x = 1 \Rightarrow 2(1^2) - 1 = 1 \quad f(2) = 1$$

$$x^3 + x = 10 \rightarrow x(x^2 + 1) = 10 \rightarrow x = 2 \Rightarrow 2(2^2) - 1 = 7 \quad f(10) = 7$$

$$f(2) + f(1) = 1 + 7 = 8$$

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$$f(x) = x^3 - 4x^2 + 12x \rightarrow (x-2)^3 + 8 \quad f(\sqrt[3]{2} + 2) = (\sqrt[3]{2})^3 + 8 = 10$$

$$g(x) = x^3 + 9x^2 + 27x \rightarrow (x+3)^3 - 27 \quad g(\sqrt[3]{2} - 3) = (\sqrt[3]{2})^3 - 27 = -26$$

$$\frac{g(\sqrt[3]{2} - 3)}{f(\sqrt[3]{2} + 2)} = \frac{-26}{10} = -\frac{13}{5}$$

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$$(f(x) + g(x))^2 = (\sqrt{x-4}\sqrt{x-4} + \sqrt{x+4}\sqrt{x-4})^2 = 2x + 2\sqrt{x^2 - (4\sqrt{x-4})^2} \rightarrow (4\sqrt{x-4})^2 = 16x - 64$$

$$2x + 2\sqrt{x^2 - 16x + 64} = 2x + 2\sqrt{(x-8)^2} = 2x + 2|x-8| = 4x - 16$$

$$f(x) + g(x) = \sqrt{4x - 16} = \sqrt{4(x-4)} = 2\sqrt{x-4} \Rightarrow a+b\sqrt{x+c} = 2\sqrt{x-4} \Rightarrow a+b=2, c=-4$$

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$$\frac{a+b}{c} = \frac{2}{-4} = -\frac{1}{2}$$

$$f(2) = \frac{4}{4-1+2} = -4, \quad f(1) = \frac{3}{1-1+2} = \frac{3}{2}, \quad f(3) = \frac{5}{9-1+2} = \frac{5}{6}, \quad f(0) = \frac{4}{3}$$

$$f(x) = \{(2, -4), (0, \frac{4}{3})\}$$

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$$\frac{g}{f} = \{(2, -\frac{1}{4}), (0, 4)\}$$

$$\text{الف) } f(2x) = \{(\frac{1}{2}, 2), (\frac{3}{2}, -1), (2, 2), (-\frac{1}{2}, 4)\}$$

$$\text{ب) } f(x^2) = \{(1, 2), (-1, 2), (\sqrt{3}, -1), (-\sqrt{3}, -1), (2, 2), (-2, 2)\}$$

$$\text{ج) } 2g^2(x) + 1 = \{(-2, 19), (1, 3), (3, 9), (-1, 1)\}$$

$$\text{د) } \frac{2f}{g} = \{(1, -4), (3, -1), (-\frac{1}{2}, \frac{1}{2})\} \Rightarrow \frac{2f}{g} = \{(1, -4), (3, -1)\}$$

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