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امتحان ریاضیات A روز یکشنبه ۱۳۹۷

$$f(x+1) = \left(\frac{1}{x}\right)^{x-1} - 1 \rightarrow x^x \cdot \left(\frac{1}{x}\right)^{x-1} \geq 0$$

$$Df = [0, 1]$$

$$f(-x) = \sqrt{-x+1-x+1} = \sqrt{-2x+2}$$

$$\begin{cases} x \geq 0, -x+1-x+1 = -2x+2 = 0 \rightarrow x=1 \\ x < 0, -x+1-x+1 = -2x+2 = 0 \rightarrow x=1 \end{cases}$$

$$Df = (-\infty, 1]$$

$$\frac{x-1}{f(x)} \geq 0 \rightarrow \frac{-1}{1} + \frac{1}{1} - \frac{1}{1} + \frac{1}{1} = 0$$

$$Df = [-1, 1] \cup (1, 3)$$

$$9x^2 - 6x^2 - 5x - 1 = (9x^2 - 6x^2 + 1) - (x^2 + 5x + 1) = (3x^2 - 1)^2 - (x+1)^2 = 0$$

$$= 3x^2 - 1 = x+1 \rightarrow 3x^2 - x - 1 = 0 \rightarrow 3x^2 - x - 1 = 3x^2 + ax + b$$

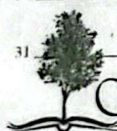
$$a = -1, b = -1 \quad \sqrt{-(a+b)} = \sqrt{2} = 1$$

$$f(x) - f\left(\frac{x}{2}\right) = (x^2 + x) - \left(\frac{x^2}{4} + \frac{x}{2}\right) = \left(x^2 - \frac{x^2}{4}\right) + \left(x - \frac{x}{2}\right) = \frac{3x^2}{4} + \frac{x}{2}$$

$$\Delta = \left(x - \frac{x}{2}\right) \left(x^2 + x + \frac{1}{4}\right) + \left(x - \frac{x}{2}\right) = \left(x - \frac{x}{2}\right) \left(x^2 + x + 1 + \frac{1}{4}\right)$$

$$x^2 + x + 1 + \frac{1}{4} \Delta < 0$$

$$x - \frac{x}{2} \geq 0 \rightarrow \frac{x}{2} \geq 0 \rightarrow D = [0, +\infty)$$



Senobar

\* با عرض پوزش سوال ۱ و ۹ جابجایی شده است.

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$$x^3 + x = x(x^2 + 1) = 2 \quad \text{در } x=1 \rightarrow 2x^2 - 1 = 1 = f(2) \quad 1$$

$$x^3 + x = x(x^2 + 1) = 10 \quad \text{در } x=3 \rightarrow 2x^2 - 1 = 7 = f(10) \quad 2$$

$$f(2) + f(10) = 11$$

$$x^3 - 6x^2 + 11x = (x-2)^3 + 1 = x^3 - 6x^2 + 12x + 8 \Rightarrow f(\sqrt{x+2}) = 10 \quad \checkmark$$

$$x^3 + 9x^2 + 14x = (x+3)^3 - 27 = x^3 + 9x^2 + 27x - 27 \Rightarrow g(\sqrt{x-2}) = -10$$

$$\frac{g(\sqrt{x-2})}{f(\sqrt{x+2})} = \frac{-10}{10} = -1$$

$$f(x) = \frac{x}{-1} \quad f(1) = \frac{1}{0} \quad f(2) = \frac{2}{0} \quad f(0) = \frac{0}{2}$$

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

$$f(x) = \sqrt{(\sqrt{x-4} + 2)^2} = |\sqrt{x-4} + 2| = \sqrt{x-4} + 2$$

$$g(x) = \sqrt{(\sqrt{x-4} - 2)^2} = |\sqrt{x-4} - 2| = \sqrt{x-4} - 2$$

$$f(x) + g(x) = 2\sqrt{x-4} \rightarrow a=0 / b=2 / c=-4 \rightarrow \frac{a+b}{c} = \frac{2}{-4} = -\frac{1}{2}$$

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

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

$$c) 19^x + 1 = \{(-2, 19), (1, 3), (3, 9), (-6, 1)\}$$

$$d) 2f(x) = \{(1, 4), (3, -2), (4, 4), (-1, 2)\}$$

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