امین حسابی

$$f(x)\begin{cases} a|x| & x<1 \\ b\sqrt[3]{x^2} & x>1 \end{cases} \longrightarrow \begin{matrix} f(x^+)=f(x^-) \\ f'(x^+)=f'(x^-) \end{matrix}$$

۱

$$a+1=b \Rightarrow x=\frac{b^2}{2\sqrt[3]{x}} \xrightarrow{x=1} b=\frac{2}{3},\ a=\frac{1}{3} \rightarrow a+b=\frac{5}{3}$$

$$f(1)<0 \rightarrow \frac{-2x+5}{3\sqrt[3]{x^2}} \rightarrow f'(x)=\frac{-2(\sqrt[3]{x^2})-(\frac{2}{3\sqrt[3]{x}}\times(-2x+5))}{(\sqrt[3]{x^2})^2} \rightarrow f'(1)=-\frac{10}{3}$$

۲

$$g(x)=\frac{|x-2|+\sqrt[3]{2x}}{\sqrt[3]{x^2}} \xrightarrow{x=1} g(x)=\frac{-x+2+\sqrt[3]{2x}}{\sqrt[3]{x^2}} \rightarrow g'(x)=\frac{(\frac{2}{3\sqrt[3]{2x}}-1)(\sqrt[3]{x^2})-(\frac{2}{3\sqrt[3]{x}}\times(-x+\sqrt[3]{2x}))}{(\sqrt[3]{x^2})^2}$$

$$\rightarrow g'(1)=\frac{3-4\sqrt{3}}{6} \rightarrow f'(1)-2g'(1)=\frac{-14+4\sqrt{3}}{3}$$

۳

$$ab+c=\frac{1}{a} \xrightarrow{\times a} ba^2+ac=1 \Rightarrow ac=2$$

$$b=-\frac{1}{a^2} \Rightarrow ba^2=-1$$

۴

$$(fog)'(-\sqrt[3]{2}) \Rightarrow x=-\sqrt[3]{2} \begin{cases} f(x)=\frac{1}{\sqrt[3]{2x}} \\ g(x)=\frac{1}{2x^3} \end{cases}$$

$$\Rightarrow f(g(x))=f(\frac{1}{2x^3})=\frac{1}{\sqrt[3]{\frac{2}{2x^3}}}=x \Rightarrow (fog)'=x'=1$$

۵

$$f'_-(a)=0 \qquad f'_+ \neq f'_-$$

$$f'_+(a)$$

$$f'(x)=m(x-a)^{m-1} \neq 0$$

$$x>a$$

$$\Rightarrow m=1 \text{ یا } m=0$$

$x=3 \Rightarrow -3a-5 = f(3)$ $\Rightarrow -a-(-3a-5)=2$

$\rightarrow -a = f'(3)$ $\Rightarrow 2a = -2 \Rightarrow a = -1$ ۹

$\Rightarrow \frac{f(3)}{f'(3)} = \frac{-0.5}{1.5} = -\frac{1}{3}$

$g'(x) = f'(x+1) + 3f'(3x+10) \longrightarrow g(-2) = f'(-1) + 3f'(4)$ ۸

جدول تناوب $\Rightarrow f'(-1) = f'(4) \Rightarrow g'(-2) = 4\left(\frac{3}{2}\right) = 6$

$fog = \left(\frac{1}{\sqrt[3]{x^2-1}}\left[\frac{1}{\sqrt[3]{x^2-1}}\right]\right)^2 + 1 \rightarrow (fog)' = 2 \times A' \times A \Rightarrow fog\left(\frac{3}{\sqrt{8}}\right)$ ۷

$= \frac{8}{\sqrt{18}} \longrightarrow \frac{\sqrt{8}}{-12\sqrt{2}} = -\frac{1}{24}$

$\lim_{h\to 0} \frac{f(a-h)-1}{a-h} \times \lim_{h\to 0} \frac{f(a-h)-2}{h} = \frac{2-1}{3} \times \lim_{h\to 0} \frac{f(a-h)-f(a)}{-h}$ ۹

$\Rightarrow -\frac{1}{a} f'(a) \Rightarrow -\frac{1}{a} \times \frac{12a}{12} = -\frac{a}{12}$

$\Rightarrow f'(x) = \sqrt[3]{x+a} + \frac{x-6}{3\sqrt[3]{(x+3)^2}} \xrightarrow{x=a} \frac{12a}{12}$

$4y = 3x+1 \Rightarrow m = \frac{1}{2} \Rightarrow m_{\text{عمود}} = -2$ ۱۰

$\Rightarrow y' = 2x-4 = -2 \Rightarrow x=1$

$y=2$