۱- مبینا موسوی دارد هم ریاضی سه‌شنبه

$d \to (3,5)$, $(0,1)$

$m = \frac{4}{3}$

$y = \frac{4}{3}x + 1 \to f'(3) = \frac{4}{3}$

$d: y = \frac{1}{3}x + \frac{4}{3}$ $\qquad -2$

$\sqrt{ax-1} = \frac{1}{3}x + \frac{4}{3}$

$\rightarrow x + 4 = 3\sqrt{ax-1}$

$\rightarrow x^2 + 8x + 16 = 9ax - 9$

$x^2 + x(8 - 9a) + 25 = 0$

$\Delta = 0 \qquad (8-9a)^2 - 4(25) = 0$

① $8 - 9a = 10 \rightarrow a = -\frac{2}{9}$

$8 - 9a = -10 \rightarrow a = 2 \quad f(5) = \sqrt{10-1} = 3$

-۳

$x=۱ \rightarrow y=\frac{m+۲}{۴}$, $y=۱$

$$y'=\frac{(۲x+m)(x+۳)-۱(x^۲+mx+۱)}{(x+۳)^۲}$$

$$f'(۱)=\frac{(۲+m)(۴)-(m+۲)}{۱۶}=\frac{۸+۴m-m-۲}{۱۶}=\frac{۳m+۶}{۱۶}=\frac{۳}{۴} \qquad ۳m+۶=۱۲ \Rightarrow \boxed{m=۲}$$

$(۱,۱) \xrightarrow{}$ در خط $\quad ۴-۳=n \Rightarrow \boxed{n=۱}$

$m+n=۳$

۴-

$$f(x) = \frac{(\cancel{3-\sin x})(9+3\sin x+\sin^2 x)}{(\cancel{3-\sin x})(3+\sin x)} = \frac{\sin^2 x+3\sin x+9}{\sin x+3}$$

$$3g(x) - f(x) = \frac{9 - \sin^2 x - 3\sin x - 9}{3+\sin x} = \frac{-\sin^2 x - 3\sin x}{3+\sin x}$$

$$= \frac{-\sin x(\sin x+3)}{\sin x+3} = -\sin x \rightarrow$$

$$3g'(x) - f'(x) = -\cos x$$

$$3g'\left(\frac{5\pi}{3}\right) - f'\left(\frac{5\pi}{3}\right) = -\cos\left(\frac{5\pi}{3}\right) = -\frac{1}{2}$$

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۵-

$$fog(x) = \frac{-1}{\sqrt[5]{\frac{1}{\underbrace{x^5+|x^5|}_{2x^5}}} + \left|\frac{1}{\underbrace{x^5+|x^5|}_{2x^5}}\right|} = -x \rightarrow$$

شیب -1

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$$\frac{f(x)-1}{x} = g(x)$$

$$g(x) = f'(0)$$

$$f'(x) = 2\left(\frac{\overset{1}{\cos x}\,(\overset{1}{1+\sin x}) - (\overset{1}{\cos x})(\overset{-1}{-1+\sin x})}{(1+\sin x)^{2}}\right)\left(\frac{-1+\overset{0}{\sin x}}{1+\underset{0}{\sin x}}\right)$$

$$= 2 \times \frac{2}{1} \times -1 = -4$$

۷-

$-x^2-1=k \to x^2=-1-k$

$x_1=\sqrt{-1-k}$

$x_2=-\sqrt{-1-k}$

مماس منحنی $\to y=-x^2-1 \to$

$y'=2x$

$2\sqrt{-1-k}\times 2-\sqrt{-1-k}=-1$

$\sqrt{-1-k}=$

$-1-k=\frac{1}{4} \to k=-\frac{5}{4}$

$\to d \to y=-\frac{5}{4} \Rightarrow$ تا محل برخورد منحنی‌ها

$=\frac{5}{4}$

$d s a x$ ১ —৯

$\rightarrow$ $২\sqrt{x}(৫x^২+২)=ax$

ভেদ → $\frac{\cancel{২}}{\cancel{২}\sqrt{x}}(৫x^২+২)+(১০x)(২\sqrt{x})=a$

$\rightarrow$ $১০x^২$

$$\frac{৫x^২+২+১৪x^২}{\sqrt{x}}=a$$

$\rightarrow$ ১

$২৫x^২+২=a\sqrt{x}$ $\rightarrow$ $a\sqrt{x}=২(৫x^২+২)$

$২৫\times\frac{১}{৫}+২=a\sqrt{\frac{২}{২}}$ as $\frac{১৪\sqrt{২}}{২}=১০\sqrt{২}$

$২৫x^২+২=১০x^২+৪ \rightarrow ১৫x^২=২ \rightarrow x^২=\frac{১}{৫}$

$x=\frac{১}{৫}$

ধরি $y = ax$

$A(m, ma)$

$$\frac{\sqrt{m}}{-2m^2+m+1} = \frac{\sqrt{m}}{ma}$$

$$\Rightarrow \sqrt{m}\,a(-2m^2+m+1) = \sqrt{m}$$

$$\Rightarrow -2am^{\frac{5}{2}} + am^{\frac{3}{2}} + am^{\frac{1}{2}} = 1$$

$$\Rightarrow -5am^{\frac{3}{2}} + \frac{3}{2}am^{\frac{1}{2}} + \frac{1}{2}am^{-\frac{1}{2}} = 0$$

$$-5m^{\frac{3}{2}} + \frac{3}{2}m^{\frac{1}{2}} + \frac{1}{2}m^{-\frac{1}{2}} = 0$$

$$\xrightarrow{\times m^{\frac{1}{2}}} -5m^2 + \frac{3}{2}m + \frac{1}{2} = 0 \Rightarrow$$

$$m = \frac{-\frac{3}{2} \pm \sqrt{\frac{9}{4}+10}}{-10} = \frac{-\frac{3}{2} \pm \frac{7}{2}}{-10} = \frac{1}{2}$$

$$\Rightarrow f\left(\frac{1}{2}\right) = \frac{\sqrt{\frac{1}{2}}}{-\cancel{2} \times \frac{1}{2\cancel{4}} + \frac{3}{2}} = \frac{\sqrt{2}}{2}$$

-9

-10

$$(f\circ g)'\left(\frac{\sqrt{3}}{2}\right) = g'\left(\frac{\sqrt{3}}{2}\right) f'\left(g\left(\frac{\sqrt{3}}{2}\right)\right)$$

$$g'(x) = \frac{\dfrac{-2x}{2\sqrt{x^2-1}}}{x^2-1} = \frac{-\dfrac{\sqrt{3}}{2}\times 2}{\dfrac{1}{4}} = -4\sqrt{3}$$

$$x < \frac{\sqrt{3}}{2} \quad x^2-1 < \frac{1}{4} \to \sqrt{x^2-1} < \frac{1}{2} \to \frac{1}{\sqrt{x^2-1}} > 2 \to f'(2) = 24\times 4$$

$$x > 2 \to f(x) = (2x)^3 = 8x^3$$

$$f'(x) = 24x^2$$

$$\frac{-4\sqrt{3}\times 24\times 4}{-48\sqrt{3}} = 8$$