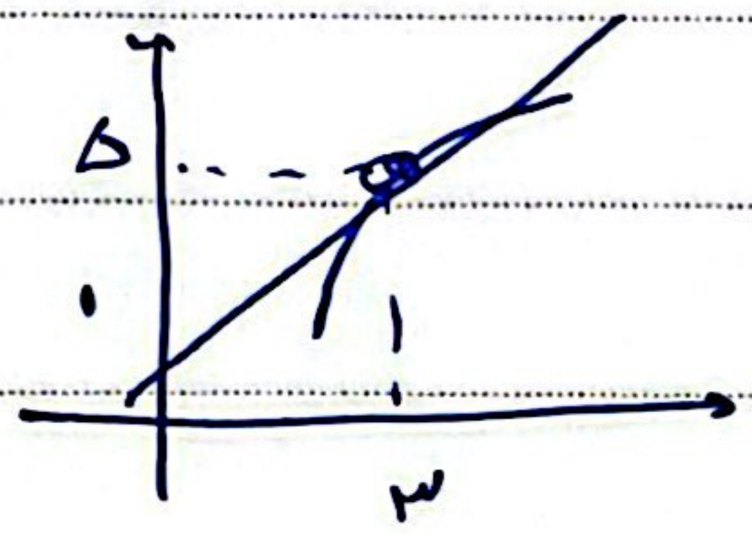
Subject
Year Month Day

۱۶

خانم سلطان آبادی



(۱) ۲ نقطه از خط $\Rightarrow (۳,۵)\ ,\ (۰,۱)$

$a = \frac{۱-۵}{۰-۳} = \frac{-۴}{-۳} = \frac{۴}{۳}$

$\Rightarrow f'(۳) = \frac{۴}{۳}$ ✓ ۲

(۳) $m = \frac{\text{قرینه ضریب } x}{\text{ضریب } y} \Rightarrow m = \frac{۳}{۴}$

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

$\xrightarrow{x=۱} \Rightarrow g' = \frac{۳(۲+m)}{۱۶} = \frac{۳}{۴} \Rightarrow ۲+m = ۴$

$\Rightarrow m = ۲$ ۲

$x=۱ \Rightarrow g = \frac{۲+m}{۴} = ۱ \Rightarrow ۴(۱) - ۳(۱) = n \Rightarrow n = ۱$

$\Rightarrow m+n = ۳$ ✓

(۲) $(۲,۲),(-۱,۱) \Rightarrow m = \frac{۲-۱}{۲+۱} = \frac{۱}{۳}$

$\Rightarrow y-۱ = \frac{۱}{۳}(x+۱)$

$\Rightarrow y = \frac{x}{۳} + \frac{۴}{۳}$ ۲

$\Delta = (۸-۹a)^۲ - ۴(۱)(۲۵) = ۰$ $\quad a = -\frac{۲}{۹}$ ×

$\Rightarrow (۸-۹a)^۲ = ۱۰۰ \quad ۸-۹a = -۱۰$

$\Rightarrow ۸-۹a = ۱۰ \Rightarrow a = ۲$ ✓

$\Delta = ۰ \Leftarrow$ مماس

$(\sqrt{ax-۱})^۲ = (\frac{x}{۳} + \frac{۴}{۳})^۲ \Rightarrow ax-۱ = \frac{x^۲+۸x+۱۶}{۹} \Rightarrow x^۲ + (۸-۹a)x + ۲۵ = ۰$

$a = ۲ \Rightarrow f(x) = \sqrt{۲x-۱} \Rightarrow f(۵) = \sqrt{۹} = ۳$ ✓

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(۹)

$g = x^2+1 \xrightarrow{} f(x) = -(x^2+1)$

$\Rightarrow f'(x) = -2x$

$f'(\alpha) \times f'(-\alpha) = -1$

$\Rightarrow (-2\alpha)(2\alpha) = -1 \Rightarrow a^2 = \frac{1}{4} \xrightarrow{a>0} a = \frac{1}{2}$ (۲)

$\Rightarrow f(\frac{1}{2}) = -((\frac{1}{2})^2+1) = \frac{-5}{4}$

$\Rightarrow A(\frac{1}{2}, \frac{-5}{4})$

تقارن

$g = \frac{-5}{4}$

$\longrightarrow d = \frac{5}{4}$

(۱۰)

$f \circ g(\frac{\sqrt{5}}{2}) = g'(\frac{\sqrt{5}}{2}) \times f'(g(\frac{\sqrt{5}}{2}))$

$g(x) = (x^2-1)^{-\frac{1}{2}} \Rightarrow g'(x) = -\frac{1}{2}(x^2-1)^{-\frac{3}{2}}(2x)$

$\Rightarrow g'(\frac{\sqrt{5}}{2}) = -\frac{1}{2} \times (\frac{5}{4}-1)^{-\frac{3}{2}} \times \sqrt{5} = -\frac{1}{2} \times 8 \times \sqrt{5}$

$= -4\sqrt{5}$

4^{-1}

$g(\frac{\sqrt{5}}{2}) = \frac{1}{\sqrt{\frac{5}{4}-1}} = \frac{1}{\sqrt{\frac{1}{4}}} = \frac{1}{(\frac{1}{2})} = 2$ (۲)

$f'(2) \Rightarrow ((2x)^3)' = (8x^3)' = 24x^2 = 24 \times 4$

$\Rightarrow \underline{24 \times 4 \times -4\sqrt{5}} = 8$

$-48\sqrt{5}$

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$g'(\sqrt[5]{3}) \times f'(g(\sqrt[5]{3})) = f\circ g'(\sqrt[5]{3})$ (۵

$x = \sqrt[5]{3} > 0 \Rightarrow f(x) = -\dfrac{1}{\sqrt[5]{2x}}$

$g(x) = \dfrac{1}{2x^5}$

$\Rightarrow f\circ g(x) = -\dfrac{1}{\sqrt[5]{\dfrac{2}{2x^5}}} = -x \Rightarrow$ ۲

$(f\circ g)'(x) = -1$

(۶

$g(x) = \dfrac{f(x)-1}{x} \Rightarrow \lim\limits_{x\to 0} g(x) = \lim \dfrac{f(x)-1}{x}$

$= f'(0)$

$f'(x) = 2\left(\dfrac{\sin x - 1}{\sin x + 1}\right)\left(\dfrac{\cos x(\sin x + 1 - \sin x + 1)}{(\sin x + 1)^2}\right)$ ۴

$\Rightarrow f'(0) = 2(-1)(2) = -4$

(۷

$f(x) = 8x^{\frac{5}{2}} + 6x^{\frac{1}{2}} \Rightarrow f'(x) = 20x^{\frac{3}{2}} + 3x^{-\frac{1}{2}}$

$\lim\limits_{x\to a} \dfrac{f(x)-0}{x-a} = f'(a) \Rightarrow 8a^{\frac{5}{2}} + 6a^{\frac{1}{2}} = 20a^{\frac{3}{2}} + 3a^{-\frac{1}{2}}$

$\Rightarrow 3a^{\frac{1}{2}} = 12a^{\frac{5}{2}} \Rightarrow 1 = 4a^2 \Rightarrow a = \frac{1}{2}$

$f'(a) = f'(\tfrac{1}{2}) = 20 \times \dfrac{1}{2\sqrt{2}} + 3\sqrt{2}$

۲ $= 5\sqrt{2} + 3\sqrt{2} = 8\sqrt{2}$

سوال ۴

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

$$\rightarrow (3g-f)(x)=\left(\frac{9}{3+\sin x}-\frac{27-\sin^3 x}{9-\sin^2 x}\right)=\frac{9}{3+\sin x}-\frac{(3-\sin x)(9+\sin^2 x+3\sin x)}{(3-\sin x)(3+\sin x)}=-\sin x$$

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

سوال ۹

$d_{\text{خط}} \rightarrow y=ax \qquad A(\alpha, a\alpha)$

$$f(\alpha)=\frac{\sqrt{\alpha}}{-2\alpha^2+\alpha+1}=a\alpha \rightarrow a\sqrt{\alpha}(-2\alpha^2+\alpha+1)=1 \rightarrow -2a\alpha^{\frac{5}{2}}+a\alpha^{\frac{1}{2}}+a\alpha^{\frac{3}{2}}=1$$

$$\xrightarrow{\text{مشتق}} -5a\alpha^{\frac{3}{2}}+\frac{3}{2}a\alpha^{\frac{1}{2}}+\frac{1}{2}a\alpha^{-\frac{1}{2}}=0 \xrightarrow[\times 2\sqrt{\alpha}]{\div a} -10\alpha^2+3\alpha+1=0 \rightarrow \begin{cases}\alpha=\frac{-1}{5}\\ \alpha=\frac{1}{2}\end{cases}$$

$$f(\alpha)=\frac{\sqrt{\frac{1}{2}}}{-2\left(\frac{1}{2}\right)^2+\frac{1}{2}+1}=\frac{\sqrt{2}}{2}$$