Subject:
Year. Month. Date. ( )

۱۳

به نام خدا بیاموزیم زندگی

۱- $m = \frac{a-1}{3} = \frac{4}{3}$ $\quad y = \frac{4}{3}x + 1$ $\quad \boxed{\frac{4}{3}}$ ✓ (۲)

۲- $m = \frac{2-1}{2+1} = \frac{1}{3}$ $\quad y = \frac{1}{3}x + \frac{4}{3}$ $\quad f(a) = \sqrt{9} = 3$ (۱٫۵)

$\sqrt{ax-1} = \frac{x+4}{3}$ توان ۲ / طرفین $\quad ax - 1 = \frac{x^2 + 8x + 16}{9}$

$f(a) = \sqrt{2(a)-1} = \sqrt{9} = 3$

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

$I, II \rightarrow x + 4 = (\frac{3a}{2})^2 = \frac{9a}{2} \rightarrow x = 4.5a - 4$

$II \rightarrow 4.5a - 4 + 4 = 3\sqrt{a(4.5a-4)-1} \rightarrow 9a^2 - 16a - 4 = 0 \rightarrow \begin{cases} a = 2 \\ a = \frac{2}{9} \end{cases}$

۳- $y = \frac{3x+n}{4}$ $\quad 1 = \frac{3+n}{4} \rightarrow n = 1$

$y'(1) = \frac{3m+6}{18} = \frac{3}{4}$ $\quad m = 2$ $\quad + \quad \boxed{3}$ ✓ (۲)

۴- $\frac{(3-\sin x)(\sin^2 x + 3\sin x + 9)}{(3-\sin x)(\sin x + 3)}$ $\quad \left(\frac{-\sin x(\sin x + 3)}{\sin x + 3}\right)$ $\quad \left(\frac{5\pi}{3}\right) =$ (۱٫۵)

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

۵- $g(x) = \frac{1}{x^5 + |x^5|}$ $\quad f(x) = \frac{-1}{\sqrt[5]{x + |x|}}$

$(f \circ g)(\sqrt[5]{3}) = -1$ ✓ $\quad \frac{-1}{\sqrt[5]{2 \times \frac{1}{2x^5}}} = -x$ (۲)

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$g(x) = f(x) - \frac{1}{x}$ $\qquad g(x) = \frac{1+\sin^2 x - 2\sin x - 1 - \sin^2 x - 2\sin x}{(1+\sin x)^2 x}$

$= \frac{-4\sin x}{x(1+\sin x)^2} \qquad \lim_{x\to 0} \frac{-4\sin x}{x(1+\sin x)^2} \to \boxed{-4}$ (۲)

۷- (۰)

$y = -x^2 - 1 \qquad y' = -2x$

$y = x^2 + 1 \xrightarrow{\text{قرینه نسبت به محور } x} y_1 = -(x^2+1) = -x^2 - 1 \xrightarrow{\text{مشتق}} y' = -2x$

خط d موازی محور x ها است ← نقاط B، A ← عرض یکسان و طول قرینه دارند. خط d منحنی y_1 را در نقاط B، A قطع کند چنان‌که

$A(\alpha, \beta)$, $B(-\alpha, \beta) \longrightarrow A(\frac{1}{2}, \beta)$, $B(-\frac{1}{2}, \beta)$

$mL_1 = y_1'(-\alpha) = -2(-\alpha) = 2\alpha$

$mL_2 = y_1'(\alpha) = -2\alpha$

عمودند $L_2, L_1 \to mL_1 \times mL_2 = -1 \to -2\alpha \cdot 2\alpha = -1 \to 4\alpha^2 = 1 \to \alpha = \pm\frac{1}{2}$

فاصله خط از مبدا مختصات $\to |\beta| \to \beta = y_1(\frac{1}{2}) = -(\frac{1}{2})^2 - 1 = -\frac{1}{4} - 1 = \frac{-5}{4} = -1.25 \to |\beta| = 1.25$

۸-

$f'(x) = 20x\sqrt{x} + \frac{3}{\sqrt{x}} \qquad (a, da)$

$f(a) = 8a^2\sqrt{a} + 6\sqrt{a} = da \qquad da = 8a^2\sqrt{a} + 6\sqrt{a}$ (۲)

$a = +\frac{1}{2}$, $-\frac{1}{2}$ غ‌ق‌ق $\qquad f'(+\frac{1}{2}) = \frac{d}{2} = \frac{8}{\sqrt{2}} \qquad d = \frac{8\times 2}{\sqrt{2}} = \boxed{8\sqrt{2}}$

۹- (۰)

خط $d \to y = ax$ $\qquad A(\alpha, a\alpha)$

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

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

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

۱۰- (۰)

$[x] = 2 \qquad (f\circ g)' = \left(\frac{-2}{\sqrt{x^2-1}}\right)' \qquad \frac{\frac{4\sqrt{5}}{\frac{1}{2}}}{\frac{1}{4}} = 16\sqrt{5}$

$\frac{16\sqrt{5}}{-48\sqrt{5}} = \boxed{-\frac{1}{3}}$

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

$g(x) = (x^2-1)^{-\frac{1}{2}} \to g'(x) = -\frac{1}{2}(x^2-1)^{-\frac{3}{2}} \times 2x \to g\left(\frac{\sqrt{5}}{2}^-\right) = \frac{1}{\sqrt{(\frac{5}{4})^- - 1}} = \frac{1}{\sqrt{(\frac{1}{4})^-}} = \frac{1}{(\frac{1}{2})^-} = 2^+$

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

$\to g'\left(\frac{\sqrt{5}}{2}^-\right) \times f'\left(g\left(\frac{\sqrt{5}}{2}\right)^-\right) = -4\sqrt{5} \times 4 \times 24 \longrightarrow \frac{24\times 4\times(-4\sqrt{5})}{-48\sqrt{5}} = 8$

PCO