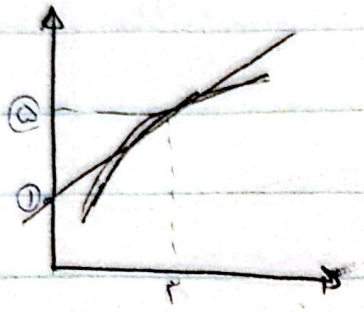


$(2,0)$ $\rightarrow \frac{0-1}{2} = f'(1)$

$f'(2) = \frac{1}{2}$

سؤال ①

سؤال ②

$y = \left| \frac{x+2}{3} \right|$

$\rightarrow y'(1) \rightarrow \frac{(2x+m)(x+3) - (1)(x^2+mx+1)}{(x+3)^2}$

$\frac{(2+m)(4) - (1)(2+m)}{16} \rightarrow \frac{(2+m)(3)}{16} \rightarrow \frac{6+3m}{16}$

$y - y_0 = m(x - x_0) \rightarrow y - \frac{8+4m}{16} = \frac{6+3m}{16}(x-1)$

$16y - 8 - 4m = 6x + 3mx - 6 - 3m \rightarrow$

$16y + (4-3m)x = 4m + 2 \rightarrow \frac{16}{4} = 4$

$-\frac{4-3m}{4} = -3 \rightarrow 4 + 3m = 12 \rightarrow 3m = 8 \rightarrow m = 3$

$n = \frac{4m+1}{4} \rightarrow \frac{12+1}{4} \rightarrow \frac{13}{4}$

$m+n \rightarrow 3 + \frac{13}{4} \rightarrow \frac{25}{4}$

سؤال ③

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

$(fg)'(\frac{\pi}{2}) = \frac{9}{2+\sin x} - \frac{9+\sin^2 x + 2\sin x}{2+\sin x} \rightarrow \frac{-\sin^2 x - 2\sin x}{2+\sin x}$

$(2g-f)'(\frac{\pi}{6}) = -\sin x \rightarrow (g-f)' = -\cos x$

$-\cos(\frac{5\pi}{6}) \rightarrow \boxed{-\frac{1}{2}}$

سؤال ٩

$g'\ f'(g(x)) \rightarrow (fog)'(x)$

$g(x) \xrightarrow{x=0} \frac{1}{2x^{\frac{5}{2}}}$

$f(g(x)) \rightarrow \frac{1}{\sqrt{\frac{2}{2x^{\frac{5}{2}}}}}$

$fog(x) = \frac{-1}{x^{-\frac{5}{5}}} \rightarrow \frac{-1}{x^{-1}} \rightarrow -x \rightarrow (fog)'(x) = \boxed{-1}$

سؤال ٩

$f'(x) = g(x) + g'(x)(x) \xrightarrow{x=0} f'(0) = g(0)$

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

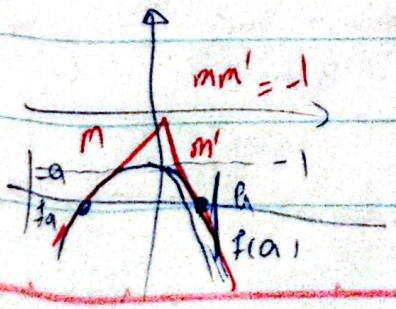
$2\left(\frac{-1}{1}\right)\left(\frac{1(1)-(1)(-1)}{1}\right) \rightarrow (-2)(2) = \boxed{-4}$

سؤال ٧

$y(2) = -x^2 - 1 \rightarrow y'(2) = -2x$ ∴

$\rightarrow m' = -2a \quad , m = -\frac{1}{2}(-a) = \frac{1}{2}a$

$mm' = -1 \rightarrow -2a \cdot \frac{1}{2}a = -1 \rightarrow a = \pm\frac{1}{2}$



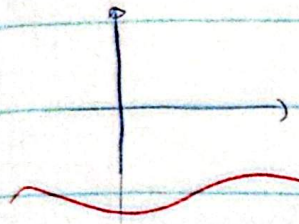
$d = -x^2 - 1 \rightarrow -\frac{1}{4} - 1 \Rightarrow \boxed{-\frac{5}{4}}$

سوال ۸ خط l در نقطه $(0,0)$ بر نمودار f که $f(0)=0$ مماس است.

$d \to (0,0)$

$$f'(x) = \frac{2}{2\sqrt{x}}\left(4x^2+3\right)+(8x)\left(2\sqrt{x}\right) \xrightarrow{x=0} f'(x)=\infty$$

← خط l قائم و موازی با محور y ها در نقطه $(0,0)$ است.



سوال ۹ خط l بر نمودار تابع f در نقطه‌ای مماس است ← مختصات آن نقطه در هردو صدق می‌کند ← آن نقطه $(0,0)$ است ← عرض آن نقطه صفر است

سوال ۱۰

$$x \to \left(\frac{\sqrt{5}}{2}\right)^- \to g(x) = \frac{1}{\sqrt{2x^2-1}} \to 2^+ \to [x]=2$$

$$f(x) \to (2x^5)^3$$

$$(f\circ g)'(x) = \left(\frac{2}{\sqrt{x^2-1}}\right)^3 \to 3\left(\frac{2}{\sqrt{2x^2-1}}\right)^2\left(-\frac{4x}{2\sqrt{x^2-1}\cdot 2}\right)$$

$$3\left(\frac{4}{2x^2-1}\right)\left(\frac{-2x}{(x^2-1)\sqrt{2x^2-1}}\right)^{x\frac{\sqrt{5}}{2}} \to 3\left(\frac{4}{\frac{1}{4}}\right)\left(\frac{-2\sqrt{5}}{\frac{1}{8}\times\frac{1}{2}}\right)$$

$$\frac{3\times 16\times -8\sqrt{5}}{-64\sqrt{5}} = 8$$