آیلا فیروزنیا

1. $\frac{y_2-y_1}{x_2-x_1} = \frac{5-1}{3-0} = \frac{4}{3} \to f'(3) = \frac{4}{3}$

2. $f'(A) = \frac{2-1}{2-(-1)} = \frac{1}{3} \to \frac{1}{3}x + \frac{4}{3}$

$\sqrt{ax-1} = \frac{1}{3}x + \frac{4}{3} \to ax-1 = \frac{1}{9}x^2 + \frac{16}{9} + \frac{8}{9}x \to 9ax-9 = x^2+8x+16$

$x^2+(8-9a)x+25=0 \to (8-9a)^2-100=0 \to 8-9a=\pm 10$

$9a=-2 \to a=\frac{-2}{9} \to f(5)=\sqrt{\frac{-2}{9}(5)-1}$ غ‌ق

$9a=18 \to a=2 \to f(5)=\sqrt{2(5)-1}=3$ ✓

3. $\frac{(2x+m)(x+3)-(1)(x^2+mx+1)}{(x+3)^2} = \frac{x^2+6x+3m-1}{(x+3)^2}$

$x=1 \to \frac{6+3m}{16} = \frac{3}{4} \to 12 = 6+3m \to m=2$

$4y=3x+n \to y=\frac{3}{4}x+\frac{n}{4}$

$y=\frac{x^2+2x+1}{x+3} \xrightarrow{x=1} y=\frac{4}{4}=1 \to 1=\frac{3}{4}+\frac{n}{4} \to n=1$

$m+n=2+1=3$

4. $(3g-f)'(\frac{5\pi}{3}) = \frac{\cancel{27}-9\sin x-\cancel{27}+\sin^3 x}{9-\sin^2 x}$

$\frac{-\sin x\cancel{(9-\sin^2 x)}}{\cancel{9-\sin^2 x}} = -\sin x \to f'(-\sin x) = -\cos x$

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

آیلا میترودینا

۵. $(f\circ g)'(\sqrt[5]{3}) \to f\circ g(x) = \frac{1}{\sqrt[5]{\frac{1}{x^5+1}+1-\frac{1}{x^5+1}}} = \frac{1}{\sqrt[5]{3(\frac{1}{3x^5})}}$

$= \frac{-1}{\frac{1}{\frac{1}{x}}} = -x \to (f\circ g)'(x) = \boxed{-1} \to (f\circ g)'(\sqrt[5]{3}) = -1$

۶. $f(x) = x g(x)+1 \to g(x) = \frac{f(x)-1}{x}$

$\lim_{x\to0} g(x) = \lim_{x\to0}\frac{f(x)-1}{x} \to \lim_{x\to0}\frac{(\frac{-1+\sin x}{1+\sin x})^2-1}{x} \to$

$\lim_{x\to0}\frac{(\frac{-1+x}{1+x})^2-1}{x} = \frac{2(\frac{-1+x}{1+x})\frac{2}{x^2+2x+1}}{1} = 2(-1)(2) = -4$

۷. قرینه $y=-x^2-1 \to y=k \to k=-x^2-1 \to x^2=-k-1 \to x=\pm\sqrt{-k-1}$

$y' = -2x$; $x = +\sqrt{-k-1} \to -2x = -2\sqrt{-k-1}$

$x = -\sqrt{-k-1} \to -2x = 2\sqrt{-k-1}$

$(-2\sqrt{-k-1})(2\sqrt{-k-1}) = -1 \to -4(-k-1) = -1 \to 4k+4 = -1$

$\to 4k = -5 \to k = -\frac{5}{4} \to y = -\frac{5}{4} \xrightarrow{\text{فاصله}} \frac{5}{4}$

۸. $f'(x) = \frac{1}{2\sqrt{x}}(4x^2+3)+(8x)(2\sqrt{x})$ ← محل برخورد (۰و۰)

$\frac{1}{\sqrt{x}}(4x^2+3)+(8x)(2\sqrt{x}) \xrightarrow{x\to0} \frac{1}{0}(3)+0 =$ تن

شیب تعریف نشده ← محور yها = l

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آیلا فیروزنیا

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$y = kx \longrightarrow kx = \frac{\sqrt{x}}{-2x^2+x+1} \longrightarrow k = \frac{1}{\sqrt{x}(-2x^2+x+1)}$

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

$y' = k \longrightarrow f'(x) = \frac{\frac{1}{2\sqrt{x}}(-2x^2+x+1) - \sqrt{x}(-4x+1)}{(-2x^2+x+1)^2}$

$= \frac{-2x^2+x+1+8x^2-2x}{2\sqrt{x}(-2x^2+x+1)^2} = \frac{6x^2-x+1}{2\sqrt{x}(-2x^2+x+1)^2}$

$k = \frac{6x^2-x+1}{2\sqrt{x}(-2x^2+x+1)^2} = \frac{1}{\sqrt{x}(-2x^2+x+1)} = 6x^2-x+1 = -4x^2+2x+2$

$10x^2-3x-1 = 0$

$x = \frac{3 \pm \sqrt{9+40}}{20} \longrightarrow -\frac{1}{5}$ غق

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

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$fog(x) = (\frac{1}{\sqrt{x^2-1}}[\frac{1}{\sqrt{x^2-1}}])^2 \longrightarrow fog(x) = (\frac{2}{\sqrt{x^2-1}})^2 = \frac{4}{x^2-1} = 4(x^2-1)^{-1}$

$x < \frac{\sqrt{5}}{2} \longrightarrow x^2 < \frac{5}{4} \longrightarrow x^2-1 < \frac{1}{4} \longrightarrow \sqrt{x^2-1} < \frac{1}{2} \longrightarrow \frac{1}{\sqrt{x^2-1}} > 2$

$\longrightarrow [\frac{1}{\sqrt{x^2-1}}] = 2 \longrightarrow fog'(x) = -4(x^2-1)^{-2}(2x) \xrightarrow{x=\frac{\sqrt{5}}{2}} -4(\frac{1}{4})^{-2}(2\times\frac{\sqrt{5}}{2})$

$= -4\times16\times\sqrt{5} = -64\sqrt{5} \quad \frac{-64\sqrt{5}}{-48\sqrt{5}} = \frac{16}{12} = \frac{8}{6} = \boxed{\frac{4}{3}}$