حل $y=ax+b \xrightarrow{x=1} y=a+b=0 \Rightarrow y=ax-a$ $\quad y=13a-a=5 \Rightarrow a=\frac{5}{12} \Rightarrow f'(2)=\frac{5}{12}$ -1

$y=ax+b \quad a=\frac{2-1}{2-(-1)}=\frac{1}{3} \Rightarrow y=\frac{1}{3}\times -1+\frac{4}{3}=1 \Rightarrow y=\frac{1}{3}x+\frac{4}{3}$ -2

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

$f'(x)=\frac{2a}{2\sqrt{ax-1}}=\frac{1}{3} \Rightarrow 3a=2\sqrt{ax-1} \Rightarrow 9a^2=4ax-4$

$\Rightarrow \frac{1}{9}x^2+\frac{16}{9}+\frac{8}{9}x=ax-\frac{9}{9}$

$\Rightarrow 9a^2-4ax+4=0 \Rightarrow (3a-2)^2=9a^2+4-12a \Rightarrow x=3,\ a=\frac{2}{3}\ \times$

$\Rightarrow \frac{1}{9}x^2+\left(\frac{8}{9}-a\right)x+\frac{25}{9}=0$

$\Rightarrow 1+\underbrace{\cancel{\left(\frac{8}{9}-\frac{6}{9}\right)}}_{\frac{2}{9}}\times 3+\frac{25}{9}=1+\frac{14}{9}\neq 0$

$\Rightarrow (3a+2)^2=9a^2+4+12a \Rightarrow x=-3,\ a=-\frac{2}{3}\ \times$

$\Rightarrow 1+\underbrace{\cancel{\left(\frac{8}{9}+\frac{6}{9}\right)}}_{\frac{14}{9}}\times -3+\frac{25}{9}=\frac{34}{9}-\frac{42}{9}\neq 0$

$x=1 \rightarrow 4y=n+3 \Rightarrow y=\frac{n+3}{4} \Rightarrow 2+m=n+3 \qquad 4y=n+12x \Rightarrow y=\frac{n+12x}{4}$

$x=1 \rightarrow y=\frac{2+m}{4}$

$y'=\frac{(2x+m)(x+3)-(x^2+mx+1)}{(x+3)^2} \Rightarrow \frac{\overbrace{4(2+m)-(2+m)}^{3(2+m)}}{16}=\frac{3}{4}$ -3

$\Rightarrow 12=6+3m \Rightarrow m=2 \Rightarrow 4=n+3 \Rightarrow n=1 \qquad \Rightarrow m+n=1+2=3$

$(3g-f)'(x)=3g'(x)-f'(x) \quad 3\times\frac{3}{3+\sin x}-\frac{\cancel{(3-\sin x)}(9+\sin^2 x+6\sin x)}{\cancel{(3-\sin x)}(3+\sin x)}=\frac{3\times 3-9-\sin^2 x-6\sin x}{3+\sin x}=\frac{\overset{-4}{\cancel{4}}-\sin^2 x-6\sin x}{3+\sin x}$

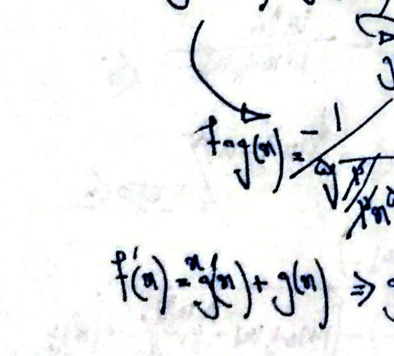
$\Rightarrow \frac{-\sin x(\sin x+6)}{3+\sin x} \Rightarrow -\sin'(x)=-\cos x=-\cos\frac{2\pi}{3}=-\frac{1}{2}$

$fog'(\sqrt[5]{2})=g'(\sqrt[5]{2})\,f'(g(\sqrt[5]{2})) \Rightarrow g'(x)=\frac{0-10x^4}{(2x^5)^2}=\frac{-5\sqrt[5]{x}}{4x^{10}}$ -5

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

$fog(x)=\frac{-1}{\sqrt[5]{\frac{2}{2x^5}}}=\frac{-1}{\frac{1}{x}}=-x \Rightarrow fog'(x)=-1$

$f'(x)=xg'(x)+g(x) \Rightarrow g(0)=f'(0) \Rightarrow f'(x)=\underbrace{2\left(\frac{\sin x-1}{\sin x+1}\right)}_{-2}\times\frac{\cos x\overbrace{(1+\sin x)}^{1}-\cos x\overbrace{(\sin x-1)}^{-1}}{(1+\sin x)^2}=-2\times 2=-4$ -6



$y=-x^2-1 \Rightarrow y'=-2x \Rightarrow -2h\times 2h=-1 \Rightarrow 4h^2=1 \Rightarrow h=\pm\frac{1}{2}$ -7

$\Rightarrow x=\frac{1}{2} \rightarrow y=-\frac{1}{4}-1=-\frac{5}{4}$

$f'(x) = ۸x \times ۲\sqrt{x} - \frac{\cancel{۲}}{\cancel{۲}\sqrt{x}}(۴x^۲+۳)$ —۸

$y = ax$

$\Rightarrow a = ۱۶x\sqrt{x} - \frac{۴x^۲+۳}{\sqrt{x}} = \frac{۱۶x^۲ - ۴x^۲+۳}{\sqrt{x}} = \frac{۱۲x^۲+۳}{\sqrt{x}}$

$۲\sqrt{x}(۴x^۲+۳) = ۸x^۲\sqrt{x} + ۶\sqrt{x} = ax \Rightarrow \frac{۸x^۲+۶}{\sqrt{x}} = a \Rightarrow ۱۲x^۲+۳ = ۸x^۲+۶$

$\Rightarrow ۴x^۲ - ۳ = ۰ \quad x = \pm \frac{۳}{۲} \quad x \neq -\frac{۳}{۲} \Rightarrow a = ۱۶ \times \frac{۳}{۲}\sqrt{\frac{۳}{۲}} - \frac{۱۲}{\sqrt{\frac{۳}{۲}}} = \frac{\cancel{۱۲}^{۳} \times \frac{۹}{\cancel{۴}} + ۳۰}{\sqrt{\frac{۳}{۲}}} = ۳۰ \times \sqrt{\frac{۲}{۳}}$

$y = ax$

$f'(x) = \frac{\frac{۱}{۲\sqrt{x}}(-۲x^۲+x+۱) - (-۴x+۱)(\sqrt{x})}{(-۲x^۲+x+۱)^۲} = a$

$\Rightarrow ax = \frac{\sqrt{x}}{-۲x^۲+x+۱} = \frac{\sqrt{x}}{(x-۱)(x+\frac{۱}{۲}) \times -۲}$ —۹

$\Rightarrow a\sqrt{x} = \frac{۱}{-۲(x-۱)(x+\frac{۱}{۲})} \Rightarrow \frac{\sqrt{x}}{-۲(x-۱)(x+\frac{۱}{۲})} = \frac{-x\sqrt{x} + \frac{۱}{۲}x + \frac{۱}{۲\sqrt{x}} - (-۴x\sqrt{x}+\sqrt{x})}{-۲x^۲+x+۱}$

$\Rightarrow \frac{-۲x^۲+x+۱}{۲\sqrt{x}} - \left(\frac{-۸x^۲+۲}{۲\sqrt{x}}\right) = \sqrt{x} \Rightarrow ۶x^۲+x-۱ = ۲x \Rightarrow ۶x^۲-x-۱ = ۰ \Rightarrow ۶(x-\frac{۳}{۶})(x+\frac{۲}{۶}) = ۰$

$x = \frac{۱}{۲}$

$\Rightarrow f(\frac{۱}{۲}) = \frac{\sqrt{\frac{۱}{۲}}}{-\frac{۱}{۲}+\frac{۱}{۲}+۱} = \sqrt{\frac{۲}{۲}}$

—۱۰