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1) a) $(\sin x \cdot \cos x)' =$

$(\sin x)' \cos x + \sin x (\cos x)' =$

$= \cos^2 x - \sin^2 x = \cos 2x$

б) $(\ln(2x+1)^3)' =$

$= \frac{1}{(2x+1)^3} \cdot 3(2x+1)^2 \cdot 2 =$

$= \frac{6}{2x+1}$

c) $\sqrt{\sin^2(\ln(x^3))} = |\sin(\ln(x^3))|$

$(x^3)' = 3x^2$

$(\ln(x^3))' = \frac{1}{x^3} \cdot 3x^2 = \frac{3}{x}$

$(|\sin(\ln(x^3))|)' = \frac{\sin(\ln(x^3))}{|\sin(\ln(x^3))|} \cdot \cos(\ln(x^3)) \times$

$\times \frac{3}{x} = \frac{3}{2x} \frac{\sin(2\ln(x^3))}{|\sin(\ln(x^3))|}$

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d) $\left(\frac{x^4}{\ln(x)}\right)' = \left\{\frac{f'g - g'f}{g^2}\right\}$

$$= \frac{4x^3 \ln(x) - \frac{1}{x} \cdot x^4}{\ln^2(x)} =$$

$$= \frac{4x^3 \ln(x) - x^3}{\ln^2(x)} = \frac{x^3(4\ln(x) - 1)}{\ln^2(x)}$$

2 $f(x) = \cos(x^2 + 3x)$, $x_0 = \sqrt{\pi}$

$f'(x_0) - ?$

$f'(x) = -\sin(x^2 + 3x)(2x + 3)$

$f'(x_0) = -\sin(\pi + 3\sqrt{\pi}) \cdot (2\sqrt{\pi} + 3) =$

$= \sin(3\sqrt{\pi}) \cdot (2\pi + 3)$

4 $f(x) = \sqrt{3x} \cdot \ln x$, $x_0 = 1$

$\operatorname{arctg}(f'(x_0)) - ?$

$f'(x) = (\sqrt{3x})' \cdot \ln x + \sqrt{3x} (\ln x)' =$

$= \left\{ (\sqrt{3x})' = \frac{1}{\sqrt{3x}} \cdot 3 = \frac{\sqrt{3}}{2\sqrt{x}} \right\} =$

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$= \frac{\sqrt{3}}{2\sqrt{x}} \cdot \ln x + \sqrt{3x} \cdot \frac{1}{x} = \frac{1}{2}\frac{\sqrt{3}}{\sqrt{x}} \ln x + \frac{\sqrt{3}}{\sqrt{x}} =$

$= \frac{\sqrt{3}}{\sqrt{x}} \left(\frac{1}{2} \ln x + 1 \right)$ #

$f'(x_0) = \frac{\sqrt{3}}{\sqrt{1}} \left(\frac{1}{2} \ln 1 + 1 \right) = \sqrt{3}$

$\operatorname{arctg} \sqrt{3} = 60^\circ$

Ответ: 60° - угол наклона касательной в x_0