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

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

$= \frac{2(2x+1)^2}{(2x+1)^3} \cdot (2x+1)' = \frac{4}{2x+1}$

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

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

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

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

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

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

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

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

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

3. $f(x) = \dfrac{x^3-x^2-x-1}{1+2x+3x^2-4x^3}$, $x_0 = 0$

$$f'(x) = \frac{(3x^2-2x-1)(1+2x+3x^2-4x^3) - (x^3-x^2-x-1)(2+6x-12x^2)}{(1+2x+3x^2-4x^3)^2}$$

подставляем $x_0 = 0$

$$f'(0) = \frac{(0-0-1)(1+0)-(0-1)(2+0)}{(1+0)^2} = 1$$

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

$f'(x) = \dfrac{1}{2\sqrt{3x}}\cdot\dfrac{1}{x}\cdot(3x)' = \dfrac{3}{2x\cdot\sqrt{3x}}$

$f'(1) = \dfrac{3}{2\cdot1\cdot\sqrt{3\cdot1}} = 0{,}866$

$tg\,\alpha = 0{,}866 \Rightarrow \alpha = arctg\,0{,}866 = 40{,}9^\circ$