a. $\left(\sin(x)\cdot\cos(x)\right)' = \left(\sin(x)\right)'\cdot\cos(x) + \left(\cos(x)\right)'\cdot\sin(x) =$

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

---

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

$= 3\cdot\ln(2x+1)^2\cdot\dfrac{(2x+1)'}{2x+1} = \boxed{\dfrac{6\ln(2x+1)}{2x+1}}$

c. $\sqrt{\sin^2(\ln(x^3))}' = \dfrac{(\sin^2(\ln(x^3)))'}{2\sqrt{\sin^2(\ln(x^3))}} =$

$= \dfrac{2\cdot\sin(\ln(x^3))\cdot(\sin(\ln(x^3)))'}{2\sqrt{\sin^2(\ln(x^3))}} =$

$= \cos(\ln(x^3))\cdot(\ln(x^3))'\cdot \dfrac{\sin(\ln(x^3))}{\sqrt{\sin^2(\ln(x^3))}} =$

$= \dfrac{3\cdot\cos(\ln(x^3))\cdot\sin(\ln(x^3))}{x\sqrt{\sin^2(\ln(x^3))}}$

---

d. $\dfrac{x^4}{\ln(x)} = \dfrac{\ln(x)\cdot(x^4)' - x^4\cdot(\ln(x))'}{\ln^2(x)} =$

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

---

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

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

$x_0 = \sqrt{\pi} \Longrightarrow 3\sin(3\sqrt{\pi}) + 2\sqrt{\pi}\cdot\sin(3\sqrt{\pi})$

3. $$\left(\frac{x^3-x^2-x-1}{1+2x+3x^2-4x^3}\right)' =$$

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

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

• $x_0=0 \Rightarrow \dfrac{-(-1)\cdot(2)+(-1)\cdot(1)}{1} = 1$

---

4. $$\left(\sqrt{3x}\cdot \ln(x)\right)' = \sqrt{3}\left(\ln(x)\cdot(\sqrt{x})' + \ln(x)'\cdot\sqrt{x}\right)$$

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

$$= \frac{\sqrt{3}(\ln(x)+2)}{2\sqrt{x}}, \quad x_0 = 1 \Rightarrow \sqrt{3}$$

т.е. $tg(\alpha) = \sqrt{3} \Rightarrow \boxed{\alpha = 60^\circ}$