

$$\begin{aligned} \text{a. } (\sin(x) \cdot \cos(x))' &= (\sin(x))' \cdot \cos(x) + (\cos(x))' \cdot \sin(x) = \\ &= \cos^2(x) - \sin^2(x) \end{aligned}$$

$$\begin{aligned} \text{b. } (\ln(2x+1)^3)' &= 3 \cdot \ln(2x+1)^2 \cdot (\ln(2x+1))' = \\ &= 3 \cdot \ln(2x+1)^2 \cdot \frac{(2x+1)'}{2x+1} = \boxed{\frac{6 \ln(2x+1)}{2x+1}} \end{aligned}$$

$$\begin{aligned}
 c. \sqrt{\sin^2(\ln(x^3))} &= \frac{(\sin^2(\ln(x^3)))'}{2\sqrt{\sin^2(\ln(x^3))}} = \\
 &= \frac{2 \cdot \sin(\ln(x^3)) \cdot (\sin(\ln(x^3)))'}{2\sqrt{\sin^2(\ln(x^3))}} = \\
 &= \cos(\ln(x^3)) \cdot (\ln(x^3))' \cdot \frac{\sin(\ln(x^3))}{\sqrt{\sin^2(\ln(x^3))}} = \\
 &= \frac{3 \cos(\ln(x^3)) \cdot \sin(\ln(x^3))}{x \sqrt{\sin^2(\ln(x^3))}}
 \end{aligned}$$

$$\begin{aligned}
 d. \frac{x^4}{\ln(x)} &= \frac{\ln(x) \cdot (x^4)' - x^4 \cdot (\ln(x))'}{\ln^2(x)} = \\
 &= \frac{4x^3 \cdot \ln(x) - x^4 \cdot \frac{1}{x}}{\ln^2(x)} = \frac{x^3(4\ln(x) - 1)}{\ln^2(x)}
 \end{aligned}$$

$$\begin{aligned}
 2. (\cos(x^2 + 3x))' &= -\sin(x^2 + 3x) \cdot (x^2 + 3x)' = \\
 &= -\sin(x^2 + 3x) \cdot (2x + 3)
 \end{aligned}$$

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

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

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

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

$$\bullet x_0 = 0 \Rightarrow \frac{-(-1) \cdot (2) + (-1) \cdot (1)}{1} = 1$$

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

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

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

$$\text{i.e. } \operatorname{tg}(\alpha) = -\sqrt{3} \Rightarrow \boxed{\alpha = 60^\circ}$$