1c $y = \sqrt{\sin^2(\ln x^3)} = |\sin(\ln x^3)|$

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

$$= \frac{3 \cdot sgn(\sin(\ln(x^3)))}{x} \cdot \cos(\ln(x^3))$$

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

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

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

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

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

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

$$f'(x) = \frac{x^3 - x^2 - x - 1}{1 + 2x + 3x^2 - 4x^3} \cdot \left[\ln(f(x))\right]' =$$

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

$$f'(x_0 = 0) = -1 \cdot (1 - 2) = 1$$

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

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

$$f'(x_0 = 1) = 0 + \sqrt{3} = \sqrt{3}$$

$$tg\alpha = \sqrt{3} \Rightarrow \alpha = 60^\circ$$