№1 ПЗ6.

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

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

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

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

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

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

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

№2.

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

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

$f'(x_0) = -\sin(\pi^2 + 3\pi) \cdot (2\pi + 3) = -0{,}33 \cdot 9{,}2832 =$

$= 3{,}0635$

№3.

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

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

$x_0 = 0$:

$$f'(x_0) = \frac{(-1)(1) - 2\cdot(-1)}{1^2} = \frac{-1+2}{1} = 1$$

№4.

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

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

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

$$= \sqrt{\frac{3}{x}} \cdot \ln x + \sqrt{\frac{3}{x}} = \sqrt{\frac{3}{x}}(\ln x + 1).$$

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