

Aufgabe 4

→ Konstante vergessen: nur ein mal $(-\frac{1}{2})$

① Teil a): $\int_0^{\pi/6} x^2 \sin(3x) dx$

$$= \left[x^2 \left(-\frac{1}{3} \cos(3x) \right) \right]_0^{\pi/6} + \frac{2}{3} \int_0^{\pi/6} x \cdot \cos(3x) dx$$

$$= 0 + \frac{2}{3} \left(\left[x \cdot \frac{1}{3} \sin(3x) \right]_0^{\pi/6} - \frac{1}{3} \int_0^{\pi/6} \sin(3x) dx \right)$$

$$= \frac{\pi}{27} + \frac{2}{3} \cdot \frac{1}{9} \left[\cos(3x) \right]_0^{\pi/6} = \underline{\underline{\frac{\pi - 2}{27}}}.$$

2x partiell
1/2

② Teil b): $\int \frac{4 \ln(\frac{1}{\tan(x)})}{\sin(x) \cos(x)} dx$

$$\begin{aligned} y &= \ln\left(\frac{1}{\tan(x)}\right) \quad \Rightarrow \quad \frac{dy}{dx} = \frac{1}{\frac{1}{\tan(x)}} \cdot \frac{-\cos(x)^2}{\tan(x)^2} \\ &\quad \text{1/2} \\ &= -\frac{1}{\sin(x) \cos(x)} \end{aligned}$$

$$\Rightarrow dx = -\sin(x) \cos(x) dy \quad \text{1/2}$$

$$\Rightarrow \int \frac{4 \ln(\frac{1}{\tan(x)})}{\sin(x) \cos(x)} dx = -4 \int y dy = -2y^2 + \text{const}$$

$$= \underline{\underline{-2 \ln\left(\frac{1}{\tan(x)}\right)^2 + \text{const}}} \quad \text{1/2}$$