

Praktikum 13

$$1) \int_2^3 \sin(5x+6) dx = \left[-\frac{1}{5} \cos(5x+6) \right]_2^3 \\ = -\frac{1}{5} \cos(21) + \frac{1}{5} \cos(16)$$

$$2) \int_2^3 \frac{x-2}{x^2-1} dx = -\frac{1}{2} \int_2^3 \frac{dx}{x-1} + \frac{3}{2} \int_2^3 \frac{dx}{x+1}$$

$$\left(\frac{x-2}{(x-1)(x+1)} = \frac{A}{x-1} + \frac{B}{x+1} \right.$$

$\swarrow \quad \quad \quad \nwarrow$
 $-\frac{1}{2} \quad \quad \quad \frac{3}{2}$

$$\rightarrow = -\frac{1}{2} [\ln|x-1|]_2^3 + \frac{3}{2} [\ln|x+1|]_2^3$$

$$= -\frac{1}{2} \ln(2) + \frac{3}{2} \ln\left(\frac{4}{3}\right)$$

$$\left(= \frac{1}{2} \ln\left(\frac{1}{2} \cdot \frac{4^3}{3^3}\right) = \frac{1}{2} \ln\left(\frac{32}{27}\right) \right)$$

$$3) \int_2^3 \frac{\sin\left(\frac{5}{x} + 6\right)}{x^2} dx$$

Substitution: $u = \frac{1}{x}$

$$\Rightarrow \frac{du}{dx} = -\frac{1}{x^2}$$

$$\Rightarrow dx = -x^2 du$$

$$= \int_{x=2}^{x=3} \frac{\sin(5u+6)}{\cancel{x^2}} (-\cancel{x^2}) du$$

$\swarrow u = 1/3$ at $x=3$
 $\nwarrow u = 1/2$ at $x=2$

$$= - \int_{1/2}^{1/3} \sin(5u+6) du = - \left[\frac{-\cos(5u+6)}{5} \right]_{1/2}^{1/3}$$

$$= \frac{1}{5} \left(\cos\left(\frac{5}{3} + 6\right) - \cos\left(\frac{5}{2} + 6\right) \right)$$

$\underbrace{\hspace{2cm}}_{\frac{23}{3}} \qquad \underbrace{\hspace{2cm}}_{\frac{17}{2}}$