Aufg. 1.2c

$$\int \frac{1}{z^3}\,dz = \int z^{-3}\,dz$$

$f(x)=x^n \Rightarrow F(x)=\frac{1}{n+1}x^{n+1}+C \qquad n\neq -1$

z.B. $x^2 \Rightarrow \frac{1}{3}x^3$

$z^{-3} \overset{n=-3}{\Rightarrow} \frac{1}{-3+1}z^{-3+1}+C$

$= \frac{1}{-2}z^{-2}+C$

Für $f(x)=\frac{1}{x}=x^{-1} \Rightarrow F(x)=\ln x + C$

Aufg. 1.2e

$$\int x^3 \cos(x^2)\,dx \qquad z=x^2 \Rightarrow dz=2x\,dx \quad \tfrac{1}{2}dz=x\,dx$$

$$= \int x^2 \cos(x^2)\, x\,dx$$

$$= \int z \cos z \,\frac{1}{2}\,dz$$

Aufg. 1.3a

$$f(x) = \tan x = \frac{\sin x}{\cos x}$$

$$f'(x) = \left(\frac{\sin x}{\cos x}\right)' = \frac{\cos x \cdot \cos x - \sin x \cdot (-\sin x)}{\cos^2 x}$$

$$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x} \quad \left| \sin^2 x + \cos^2 x = 1 \right.$$

$$\text{entweder} = \frac{1}{\cos^2 x}$$

$$\text{oder} = \frac{\cos^2 x}{\cos^2 x} + \frac{\sin^2 x}{\cos^2 x} = 1 + \tan^2 x$$

$$\Rightarrow f(x) = \frac{1}{\cos^2 x} \Rightarrow F(x) = \tan x + c$$