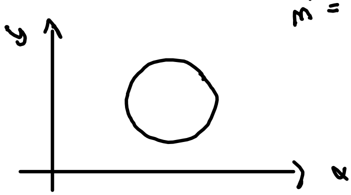
Voorbeeld Stokes

Curl : $\vec{\nabla} \times \vec{A} = 3(y^2, z^2, x^2)$

Surface integration over S_1

$\vec{n} = (0,0,1)$



$$dS = \vec{n} \cdot r \cdot dr \cdot d\theta$$
$$= (0, 0, r\,dr\,d\theta)$$

$$\int_0^R \int_0^{2\pi} (\nabla \times A) \cdot dS = \int_0^R \int_0^{2\pi} 3 r^2 \cos^2\theta \cdot r \cdot dr\,d\theta$$

Surface integration over S_2

the bolcoordinaten :

$$\vec{n} = \frac{(R\sin\theta\cos\varphi, R\sin\theta\sin\varphi, R\cos\theta)}{R}$$
$$= (\sin\theta\cos\varphi, \sin\theta\sin\varphi, \cos\theta)$$

$$dS = \vec{n} \cdot R^2 \sin\theta \cdot d\varphi\,d\theta$$

$$\int_0^{\pi} \int_0^{2\pi} (\vec{\nabla} \times \vec{A}) \cdot dS$$

Line integral :

$$(-R\sin\theta, R\cos\theta, 0)\,d\theta$$

$$\oint_C A \cdot d\vec{r} = \int_0^{2\pi} (0, R^3\cos^3\theta, R^3\sin^3\theta) \cdot (-R\sin\theta, R\cos\theta, 0) \cdot d\theta$$