

Aufgabe 3

19.1.6

Pauline Mies
Kira Drebes
Max Befort

$$f: \mathbb{R}^3 \rightarrow \mathbb{R}^3 \quad \operatorname{div} f(x) := \sum_{i=1}^n \frac{\partial f_i(x)}{\partial x_i}$$

$$(i) \quad f_1(x, y, z) = (xy, yz, zx)$$

$$\Rightarrow \operatorname{div} f(x, y, z) = \frac{\partial f_1}{\partial x} + \frac{\partial f_2}{\partial y} + \frac{\partial f_3}{\partial z}$$

$$= \frac{\partial xy}{\partial x} + \frac{\partial yz}{\partial y} + \frac{\partial zx}{\partial z}$$

$$= y + z + x$$

Im Punkt $(1, 0, 1)$ auswerten $\Rightarrow 0 + 1 + 1 = 2$

$$(ii) \quad f_2(x, y, z) = (x + y^2, \sin xy, e^z)$$

$$\Rightarrow \operatorname{div} f(x, y, z) = \frac{\partial f_1}{\partial x} + \frac{\partial f_2}{\partial y} + \frac{\partial f_3}{\partial z}$$

$$= \frac{\partial x + y^2}{\partial x} + \frac{\partial \sin xy}{\partial y} + \frac{\partial e^z}{\partial z}$$

$$= 1 + x \cdot \cos xy + e^z$$

Im Punkt $(0, 1, 2)$ auswerten: $1 + e^2$