Gruppe 2.2 Aufgabe 19.1 Nr. 7

Theresa Jürgens,
Lisa Seemann,
Sophie Kellers

$f_i \in C^1(\mathbb{R}^3, \mathbb{R}^3)$

(i) $f_1(x,y,z) = (2xy^2 - z^2, xyz, xy + yz)$

$$\operatorname{rot} f_1(x,y,z) = \left(\frac{\partial(xy+yz)}{\partial y} - \frac{\partial(xyz)}{\partial z}, \frac{\partial(2xy^2-z^2)}{\partial z} - \frac{\partial(xy+yz)}{\partial x}, \frac{\partial(xyz)}{\partial x} - \frac{\partial(2xy^2-z^2)}{\partial y} \right)$$

$$= (x + z - xy, -2z - y, yz - 4xy)$$

$$\operatorname{rot} f_1(1,1,1) = (1+1-1, -2\cdot 1 - 1, 1-4)$$

$$= (1, -3, -3)$$

(ii) $f_2(x,y,z) = (xy, yz, x^2+y^2+z^2)$

$$\operatorname{rot} f_2(x,y,z) = \left(\frac{\partial(x^2+y^2+z^2)}{\partial y} - \frac{\partial(yz)}{\partial z}, \frac{\partial(xy)}{\partial z} - \frac{\partial(x^2+y^2+z^2)}{\partial x}, \frac{\partial(yz)}{\partial x} - \frac{\partial(xy)}{\partial y} \right)$$

$$= (2y - y, 0 - 2x, 0 - x)$$

$$\operatorname{rot} f_2(0,1,2) = (2\cdot 1 - 1, 0 - 2\cdot 0, 0 - 0)$$

$$= (1, 0, 0)$$