Intelligente Sehsysteme - Übungsblatt 3

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3 Laplace-Operator

$$\nabla^2 f = \sum_{k=1}^{n} \frac{\partial^2 f}{\partial x_k^2}$$

A. $f(x_1, x_2, x_3) = x_1^2 + x_2^2 + x_3^2$

$$\frac{\partial^2 f}{\partial x_1^2} = \frac{\partial^2 f}{\partial x_2^2} = \frac{\partial^2 f}{\partial x_3^2} = 2$$

$$\nabla^2 f = 2 + 2 + 2 = 6$$

B. $f(x_1, x_2, x_3) = x_1^2 \cdot x_2^2 \cdot x_3$

$$\frac{\partial^2 f}{\partial x_1^2} = 2 \cdot x_2^2 \cdot x_3$$

$$\frac{\partial^2 f}{\partial x_2^2} = 2 \cdot x_1^2 \cdot x_3$$

$$\frac{\partial^2 f}{\partial x_3^2} = 0$$

$$\nabla^2 f = 2 \cdot x_2^2 \cdot x_3 + 2 \cdot x_1^2 \cdot x_3 + 0$$