

[HTML]2E7D32 Matrix Representation eines Linear Operators

Suppose $T \in \mathcal{L}(V)$. The matrix of T with respect to a basis v_1, \dots, v_n of V is the $n \times n$ matrix

$$\mathcal{M}(T) = \begin{pmatrix} A_{1,1} & \dots & A_{1,n} \\ \vdots & & \vdots \\ A_{n,1} & \dots & A_{n,n} \end{pmatrix}$$

whose entries $A_{j,k}$ are defined by: $Tv_k = A_{1,k}v_1 + A_{2,k}v_2 + \dots + A_{n,k}v_n$
 red The k^{th} column of the matrix $\mathcal{M}(T)$ is formed from the coefficients used to write Tv_k as a linear combination of the basis v_1, \dots, v_n

Examples: $T \in \mathcal{L}(\mathbb{F}^3)$ by $T(x, y, z) = (2x + y, 5y + 3z, 8z)$, then $\mathcal{M}(T)$ with respect to the standard basis of \mathbb{F}^3 is

$$\mathcal{M}(T) = \begin{pmatrix} 2 & 1 & 0 \\ 0 & 5 & 3 \\ 0 & 0 & 8 \end{pmatrix}$$

Recommended Reading

- **Lineare Algebra 1** by Menny-Akka (Match: 0.70)
- **Prüfungstraining Lineare Algebra : Band I** by Thomas C. T. Michaels (Match: 0.70)
- **Tutorium Analysis 1 und Lineare Algebra 1** by Florian Modler, Martin Kreh (Match: 0.69)