

7.3.8

$$F: \mathbb{R}^3 \rightarrow \mathbb{R}^3 \text{ linjär}$$

$$F\left(\underline{e}\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}\right) = \underline{e}\begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix}$$

$$F\left(\underline{e}\begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}\right) = \underline{e}\begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix}$$

$$F\left(\underline{e}\begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}\right) = \underline{e}\begin{pmatrix} 2 \\ 1 \\ 5 \end{pmatrix}.$$

Dvs

$$F(\bar{e}_1 + \bar{e}_2) = 2\bar{e}_1 + \bar{e}_2,$$

$$F(\bar{e}_2) = -\bar{e}_1 + 2\bar{e}_2 + \bar{e}_3,$$

$$F(\bar{e}_2 + \bar{e}_3) = 2\bar{e}_1 + \bar{e}_2 + 5\bar{e}_3.$$

Bestäm arb. matrisen A för F .

$$\begin{array}{l} \uparrow \\ (-1) \left\{ \begin{array}{l} F(\bar{e}_1) + F(\bar{e}_2) = 2\bar{e}_1 + \bar{e}_2 \\ F(\bar{e}_2) = -\bar{e}_1 + 2\bar{e}_2 + \bar{e}_3 \\ \downarrow \\ F(\bar{e}_2) + F(\bar{e}_3) = 2\bar{e}_1 + \bar{e}_2 + 5\bar{e}_3 \end{array} \right. \end{array}$$

$$\Leftrightarrow \left\{ \begin{array}{l} F(\bar{e}_1) = 3\bar{e}_1 - \bar{e}_2 - \bar{e}_3 \\ F(\bar{e}_2) = -\bar{e}_1 + 2\bar{e}_2 + \bar{e}_3 \\ F(\bar{e}_3) = 3\bar{e}_1 - \bar{e}_2 + 4\bar{e}_3 \end{array} \right.$$

$$F(\bar{e}_1) = \underline{e}\begin{pmatrix} 3 \\ -1 \\ -1 \end{pmatrix}$$

$$\text{Arb. matr. } A = \begin{pmatrix} 3 & -1 & 3 \\ -1 & 2 & -1 \\ -1 & 1 & 4 \end{pmatrix}$$

$\begin{matrix} F(\bar{e}_1) & F(\bar{e}_2) & F(\bar{e}_3) \end{matrix}$