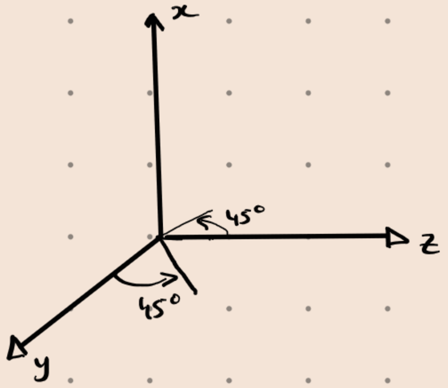
Seminarium 4

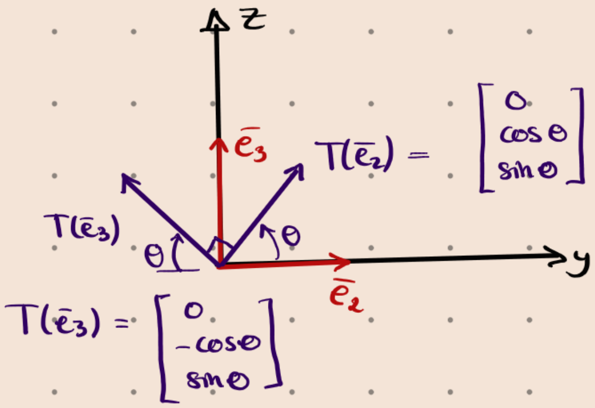
Seminarium 10-12

VAR 1

$T : \mathbb{R}^3 \to \mathbb{R}^3$



I planet



x_1 är invariant under transformen! $T(\bar{e}_1) = \bar{e}_1$

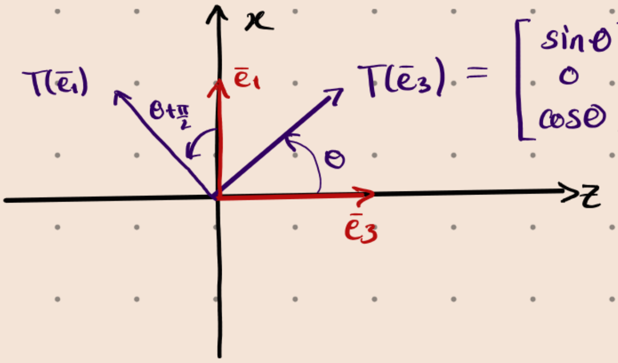
$$\Rightarrow \quad A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\theta & -\cos\theta \\ 0 & \sin\theta & \sin\theta \end{bmatrix} = \left\{ \theta = \frac{\pi}{4} \right\} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1/\sqrt{2} & -1/\sqrt{2} \\ 0 & 1/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$$

$\det(A) = \frac{1}{2} + \frac{1}{2} = 1 \neq 0$ A är inverterbar!

VAR 2:

$$A = \begin{bmatrix} \sin\theta & 0 & \sin\theta \\ 0 & 1 & 0 \\ -\cos\theta & 0 & \cos\theta \end{bmatrix}$$

, linj. oberoende kolumner $\Rightarrow$ A är inverterbar enligt sats (Invertible matrix theorem)



$$T(\bar{e}_3) = \begin{bmatrix} \sin\theta \\ 0 \\ \cos\theta \end{bmatrix}, \quad T(\bar{e}_1) = \begin{bmatrix} \sin\theta \\ 0 \\ -\cos\theta \end{bmatrix}$$

$$A = \begin{bmatrix} 1/\sqrt{2} & 0 & 1/\sqrt{2} \\ 0 & 1 & 0 \\ -1/\sqrt{2} & 0 & 1/\sqrt{2} \end{bmatrix}$$