Esimerkki

$\underset{2\times 2}{A}$; $\lambda_{1,2} = \pm 1$, $x_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$, $x_2 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$

$\underline{X} = (x_1 \;\; x_2)$; $A\underline{X} = \underline{X}\Lambda$ ⊗

eli

$A = \underline{X}\Lambda\underline{X}^{-1}$

⊗ Taululla oli tässä kohtaa virhe!

$$\begin{cases} Ax_1 = \lambda_1 x_1 \\ Ax_2 = \lambda_2 x_2 \end{cases} \iff A\underline{X} = \underline{X}\Lambda$$

$$\underline{X} = \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \; ; \; \underline{X}^{-1} = \frac{1}{2}\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$$

Huomaa, että $\underline{X}^{-1} = \alpha\underline{X}$!

Taululla lasku meni läpi ongelmitta.

Saadaan: $A = \underline{X}\Lambda\underline{X}^{-1} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

Siis: $p(A) = \lambda^2 - 1 = 0 \Rightarrow \lambda_{1,2} = \pm 1$

Ratkaistaan x_1, x_2:

x_1: Sij. $\lambda_1 = 1$: $\begin{array}{cc|c} -1 & 1 & 0 \\ 1 & -1 & 0 \end{array}$

$\Rightarrow \xi_1 = \xi_2$

x_2: $\lambda_2 = -1$: $\left(\begin{array}{cc|c} 1 & 1 & 0 \\ 1 & 1 & 0 \end{array}\right)$

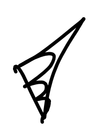
$\xi_1 = -\xi_2$

Ominaisvektorit voi siis valita vapaasti:

$$x_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \quad x_2 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

$$A \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} = 1 \cdot \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$A \begin{pmatrix} 1 \\ -1 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} = -1 \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$



Hurraa.