$$A = SDS^{-1} = S \underbrace{\begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}}_{D} S^{-1} = S \left(\underbrace{\underbrace{\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}}_{D_1} + \underbrace{\begin{pmatrix} 0 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 0 \end{pmatrix}}_{D_2} + \underbrace{\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 3 \end{pmatrix}}_{D_3}}_{=D} \right) S^{-1}$$

$$S = (v^{(1)}, v^{(2)}, v^{(3)})$$

$\lambda_1 = 1 \quad \lambda_2 = 2 \quad \lambda_3 = 3$

falls EV auf Länge 1 normiert (da A symmetrisch ist) $\rightarrow S^{-1} = S^T$

$$\Rightarrow A = A_1 + A_2 + A_3 \quad \text{mit} \quad A_1 = S D_1 S^{-1}$$

bzw. S^T

$$A_2 = S D_2 S^{-1}$$

$$A_3 = S D_3 S^{-1}$$