

Universiteit van Johannesburg

Toegepaste Wiskunde 3B

Taak #1

7:30, 21 Julie 2008

1. Laat

$$A := \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}.$$

Bepaal die eiewaardes λ_1 en λ_2 . Bepaal die ooreenstemmende genormaliseerde eievektore \mathbf{x}_1 en \mathbf{x}_2 . Bereken

$$\lambda_1 \mathbf{x}_1 \mathbf{x}_1^T + \lambda_2 \mathbf{x}_2 \mathbf{x}_2^T.$$

2. Laat

$$A := \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}.$$

Bepaal die eiewaardes λ_1 en λ_2 . Bepaal die ooreenstemmende genormaliseerde eievektore \mathbf{x}_1 en \mathbf{x}_2 . Bereken

$$\lambda_1 \mathbf{x}_1 \mathbf{x}_1^T + \lambda_2 \mathbf{x}_2 \mathbf{x}_2^T.$$

3. Vind 'n 2×2 matriks met eiewaardes 0 en 1 en met ooreenstemmende eigenvektore $(1 \ 0)^T$ en $(0 \ 1)^T$.

4. Vind 3 verskillende ortonormale basisse vir die vektorruimte \mathbb{R}^3 .

University of Johannesburg

Applied Mathematics 3B

Assignment #1

7:30, 21 July 2008

1. Let

$$A := \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}.$$

Determine the eigenvalues λ_1 and λ_2 . Determine the corresponding orthonormal eigenvectors \mathbf{x}_1 and \mathbf{x}_2 . Calculate

$$\lambda_1 \mathbf{x}_1 \mathbf{x}_1^T + \lambda_2 \mathbf{x}_2 \mathbf{x}_2^T.$$

2. Let

$$A := \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}.$$

Determine the eigenvalues λ_1 and λ_2 . Determine the corresponding orthonormal eigenvectors \mathbf{x}_1 and \mathbf{x}_2 . Calculate

$$\lambda_1 \mathbf{x}_1 \mathbf{x}_1^T + \lambda_2 \mathbf{x}_2 \mathbf{x}_2^T.$$

3. Find a 2×2 matrix with eigenvalues 0 and 1 and corresponding eigenvectors $(1 \ 0)^T$ and $(0 \ 1)^T$.

4. Find 3 different orthonormal bases for the vector space \mathbb{R}^3 .
