Mathematics Preparatory Course - MSc in EEBL

Matrix algebra

Exercises

1. Solve the following system of linear equations:

   - Let $Ax = b$, where $A = \begin{pmatrix} t & 0 & t \\ 0 & 1 & 1 \\ t & 1 & 2t \end{pmatrix}$ and $b = \begin{pmatrix} 0 \\ -2 \\ 2 \end{pmatrix}$.

   - Let $Ax = b$, where $A = \begin{pmatrix} 1 & 1 & 0 \\ -1 & 0 & t \\ -t & t & 2 \end{pmatrix}$ and $b = \begin{pmatrix} -1 \\ 0 \\ t \end{pmatrix}$.

   - Let $Ax = b$, where $A = \begin{pmatrix} t & 1 & 3 \\ 1 & -1 & 0 \\ 2 & t & 2 \end{pmatrix}$ and $b = \begin{pmatrix} 1 \\ 1 \\ 2t \end{pmatrix}$.

   - Let $Ax = b$, where $A = \begin{pmatrix} 1 & -t & 0 \\ -t & 1 & 0 \\ -2 & -t & 1 \end{pmatrix}$ and $b = \begin{pmatrix} 0 \\ 1 \\ -t \end{pmatrix}$.

   - Let $Ax = b$, where $A = \begin{pmatrix} t & 0 & t \\ 0 & t & 2 \\ -1 & 1 & t \end{pmatrix}$ and $b = \begin{pmatrix} 0 \\ 1 \\ t \end{pmatrix}$.

2. Compute the eigenvalues

   - $A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$

- $A = \begin{pmatrix} 1 & 3 \\ 2 & 6 \end{pmatrix}$

- $A = \begin{pmatrix} 3 & 4 \\ 4 & 3 \end{pmatrix}$

- $A = \begin{pmatrix} 3 & -1 & 0 \\ -1 & 3 & 0 \\ 0 & 0 & 6 \end{pmatrix}$

3. Fix the parameter h so that the matrix $D = \begin{pmatrix} h & 1 & 0 \\ 1-h & 0 & 2 \\ 1 & 1 & h \end{pmatrix}$