

1 SYSTEMS OF LINEAR EQUATIONS

1.1 Solving systems of linear equations

Vectors – stutt skilgreining, transpose, addition, multiplication, linear combinations

Matrices – stutt skilgreining

Single linear equation – ?

Systems of linear equations

Gaussian elimination

Replacement operations

Scale operations

Swap operations

Row equivalent ?

1.2 Vectors and Matrices

Vector – matrix multiplication, matrix-matrix multiplication

Span

linear equations in matrix form (augmented matrix)

free parameter

consistent and inconsistent systems

1.3 Kernels, Rank, Homogeneous Equations

Kernel and null space

Rank of matrix – uses etc

Linear independence of vectors

2 VECTOR SPACES

2.1 Euclidian Vector Spaces

Define spaces

2.2 Lines, Planes and Hyperplanes

2.3 Linear Transformations

Functions/mappings/transformations

Domain, co-domain, range

Injective, surjective

linear transformations

2.4 General Vector Spaces

3 MATRIX OPERATIONS

3.1 Matrices

Dot product

Identity matrix

Diagonal matrix

Transpose

Symmetric

Elementary

- 3.2 Matrix Inverses
 - Solve systems with inverse
 - Left and right inverse
 - Invertible (invertible matrix theorem?)
 - LU factorization
 - Computing inverse

4 DETERMINANTS

- 4.1 Determinants: Introduction
 - Compute determinants
 - Applications
- 4.2 Determinants: Properties
 - Minors and cofactors

5 VECTOR SUBSPACES

- 5.1 Column, Row and Null Spaces
 - Row and column space
- 5.2 Bases and Dimension
 - Basis for space
 - Coordinate vector
- 5.3 Coordinate Systems

6 EIGENSYSTEMS

- 6.1 Eigenvalues and Eigenvectors
 - Eigen values and vectors
 - Determinants to find eigenvalues
 - Diagonalizable
 - Characteristic polynomial
 - Applications

7 INNER-PRODUCT VECTOR SPACES

- 7.1 Inner-Product Spaces
- 7.2 Orthogonality
 - Gram schmidt
 - Least squares

8 ADDITIONAL TOPICS

8.1 Hermitian Matrices and the Spectral Theorem