Linear Algebra Concepts

- Systems of equations
  - A linear equation
  - A system of linear equations
  - Augmented matrix
  - Echelon form
  - Reduced echelon form
  - Pivots
  - Pivot columns
  - Basic/free variables
  - Consistent/inconsistent systems
  - Unique/non-unique solutions
  - Parametric vector form
  - Homogeneous system
    - Trivial/nontrivial solution
  - Nonhomogeneous system
- Collections of vectors
  - Linear combination
  - Span
  - Linear independence
- Linear transformations
  - Properties of linearity
  - Standard matrix of a transformation
  - Domain
  - Codomain
  - Image
  - Range
  - Onto
  - One-to-one
- Matrices
  - Matrix multiplication
  - Matrix inverse
  - Singular matrix
- Subspaces
  - Subspace
  - Basis
  - Coordinates
  - Dimension of a subspace
  - Rank
  - Column space
  - Null space
- Least-squares
  - Dot product

    - Orthogonality
    - Orthonormality
    - Orthogonal (or orthonormal) set
    - Orthogonal (or orthonormal) basis
    - Orthogonal complement
    - Projection
    - Gram-Schmidt orthogonalization
    - Least-squares solution
    - Least-squares error
    - Fitting a model to data
- Case studies
    - PageRank
    - Markov chains
    - Encryption