

Midterm 1 Study Guide
MATH 123 - Spring 2024
Tufts University, Department of Mathematics

- **Linear Algebra:** Matrices, matrix algebra, symmetry, eigendecompositions, semi-definiteness

- **PCA:** Assumptions on data, formulation, mathematical derivation, application to data, use for dimension reduction, strengths and weaknesses

- **SVD:** Assumptions on matrix, formulation, mathematical derivation, application to data, use for constructing low-rank approximations, connection to PCA

- **NMF:** Intuition, formulation as an optimization problem, algorithm, strengths and weaknesses

- **K-Means:** Intuition, formulation as an optimization problem, mathematical derivation, use on data, strengths and weaknesses

It is recommended to study old homework first, followed by in-class notes, followed by extra material from textbooks and outside sources.