Linear Algebra Learning Objectives¹

- 1. Determine whether an equation is linear; know when a system of linear equations has solutions, and find solutions using Gaussian elimination.
- 2. Manipulate vectors in \mathbb{R}^n and matrices algebraically; multiply matrices and find matrix inverses.
- 3. Prove facts about vector spaces and subspaces; determine whether a given subset is a subspace; and determine when sets of vectors are linearly independent, spanning sets, and/or bases.
- 4. Find the row, column, and nullspaces of matrices; identify linear transformations and find their kernels and images.
- 5. Use dot products and inner products to project one vector onto another, and use this to find orthogonal decompositions of vectors with respect to given subspaces.
- 6. Compute the determinant and trace of a matrix; determine whether a vector is an eigenvector of a given matrix; find the eigenvectors and eigenvalues of a matrix; use eigenvectors to diagonalize a matrix.

¹This list was approved by the department on 5/3/19.