
Linear Algebra Standards

How can we solve systems of linear equations?

- ☐ ☐ **E1. Systems as matrices.** I can translate back and forth between a system of linear equations and the corresponding augmented matrix.
- ☐ ☐ **E2. Row reduction.** I can put a matrix in reduced row echelon form.
- ☐ ☐ **E3. Systems of linear equations.** I can solve a system of linear equations.
- ☐ ☐ **E4. Homogeneous systems.** I can find a basis for the solution set of a homogeneous system of equations.

What is a vector space?

- ☐ ☐ **V1. Vector space.** I can determine if a set with given operations forms a vector space.
- ☐ ☐ **V2. Linear combinations.** I can determine if a vector can be written as a linear combination of a given set of vectors.
- ☐ ☐ **V3. Spanning sets.** I can determine if a set of vectors spans a vector space.
- ☐ ☐ **V4. Subspaces.** I can determine if a subset of a vector space is a subspace or not.

What structure do vector spaces have?

- ☐ ☐ **S1. Linear independence.** I can determine if a set of vectors is linearly dependent or independent.
- ☐ ☐ **S2. Basis verification.** I can determine if a set of vectors is a basis of a vector space.
- ☐ ☐ **S3. Basis construction.** I can compute a basis for the subspace spanned by a given set of vectors.
- ☐ ☐ **S4. Dimension.** I can compute the dimension of a vector space.

How can we understand linear maps algebraically?

- ☐ ☐ **A1. Linear maps as matrices.** I can write the matrix (with respect to the standard bases) corresponding to a linear transformation between Euclidean spaces.
- ☐ ☐ **A2. Linear map verification.** I can determine if a map between vector spaces is linear or not.
- ☐ ☐ **A3. Injectivity and surjectivity.** I can determine if a given linear map is injective and/or surjective.
- ☐ ☐ **A4. Kernel and Image.** I can compute the kernel and image of a linear map, including finding bases.

What algebraic structure do matrices have?

- ☐ ☐ **M1. Matrix Multiplication.** I can multiply matrices.
- ☐ ☐ **M2. Invertible Matrices.** I can determine if a square matrix is invertible or not.
- ☐ ☐ **M3. Matrix inverses.** I can compute the inverse matrix of an invertible matrix.

How can we understand linear maps geometrically?

- ☐ ☐ **G1. Determinants.** I can compute the determinant of a square matrix.
- ☐ ☐ **G2. Eigenvalues.** I can find the eigenvalues of a square matrix, along with their algebraic multiplicities.
- ☐ ☐ **G3. Eigenvectors.** I can find the eigenspace of a square matrix associated to a given eigenvalue.
- ☐ ☐ **G4. Geometric multiplicity.** I can compute the geometric multiplicity of an eigenvalue of a square matrix.