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.