Linear Algebra Standards

How can we solve systems of linear equations?

☐ ☐ **E.1 Systems as matrices**. I can translate back and forth between a system of linear equations and the corresponding augmented matrix.

☐ ☐ **E.2 Row reduction**. I can put a matrix in reduced row echelon form.

☐ ☐ **E.3 Systems of linear equations**. I can solve a system of linear equations.

☐ ☐ **E.4 Homogeneous systems**. I can find a basis for the solution set of a homogeneous system of equations.

What is a vector space?

☐ ☐ **V.1 Vector space**. I can determine if a set with given operations forms a vector space.

☐ ☐ **V.2 Linear combinations**. I can determine if a vector can be written as a linear combination of a given set of vectors.

☐ ☐ **V.3 Spanning sets**. I can determine if a set of vectors spans a vector space.

☐ ☐ **V.4 Subspaces**. I can determine if a subset of a vector space is a subspace or not.

What structure do vector spaces have?

☐ ☐ **S.1 Linear independence**. I can determine if a set of vectors is linearly dependent or independent.

☐ ☐ **S.2 Basis verification**. I can determine if a set of vectors is a basis of a vector space.

☐ ☐ **S.3 Basis construction**. I can compute a basis for the subspace spanned by a given set of vectors.

☐ ☐ **S.4 Dimension**. I can compute the dimension of a vector space.

How can we understand linear maps algebraically?

☐ ☐ **A.1 Linear maps as matrices**. I can write the matrix (with respect to the standard bases) corresponding to a linear transformation between Euclidean spaces.

☐ ☐ **A.2 Linear map verification**. I can determine if a map between vector spaces is linear or not.

☐ ☐ **A.3 Injectivity and surjectivity**. I can determine if a given linear map is injective and/or surjective.

☐ ☐ **A.4 Kernel and Image**. I can compute the kernel and image of a linear map, including finding bases.

What algebraic structure do matrices have?

☐ ☐ **M.1 Matrix Multiplication**. I can multiply matrices.

☐ ☐ **M.2 Invertible Matrices**. I can determine if a square matrix is invertible or not.

☐ ☐ **M.3 Matrix inverses**. I can compute the inverse matrix of an invertible matrix.

How can we understand linear maps geometrically?

☐ ☐ **G.1 Determinants**. I can compute the determinant of a square matrix.

☐ ☐ **G.2 Eigenvalues**. I can find the eigenvalues of a square matrix, along with their algebraic multiplicities.

☐ ☐ **G.3 Eigenvectors**. I can find the eigenspace of a square matrix associated to a given eigenvalue.

☐ ☐ **G.4 Geometric multiplicity**. I can compute the geometric multiplicity of an eigenvalue of a square matrix.