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. \square **E2. Row reduction**. I can put a matrix in reduced row echelon form. □ **E3.** Systems of linear equations. I can compute the solution set for a system of linear equations. What is a vector space? □ V1. Vector property verification. I can show why an example satisfies a given vector space property, but does not satisfy another given property. □ **V2.** Vector space identification. I can list the eight defining properties of a vector space, infer which of these properties a given example satisfies, and thus determine if the example is a vector space. □ **V3.** Linear combinations. I can determine if a Euclidean vector can be written as a linear combination of a given set of Euclidean vectors. \square V4. Spanning sets. I can determine if a set of Euclidean vectors spans \mathbb{R}^n . \square \square V5. Subspaces. I can determine if a subset of \mathbb{R}^n is a subspace or not. What structure do vector spaces have? □ S1. Linear independence. I can determine if a set of Euclidean vectors is linearly dependent or independent. \square S2. Basis verification. I can determine if a set of Euclidean vectors is a basis of \mathbb{R}^n . □ S3. Basis computation. I can compute a basis for the subspace spanned by a given set of Euclidean vectors. \square **S4. Dimension**. I can compute the dimension of a subspace of \mathbb{R}^n . □ S5. Abstract vector spaces. I can solve exercises related to standards V3-S4 when posed in terms of polynomials or matrices. □ S6. Basis of solution space. I can find a basis for the solution set of a homogeneous system of equations. How can we understand linear maps algebraically? □ □ A1. Linear maps and matrices. I can translate back and forth between a linear transformation of Euclidean spaces and its standard matrix, and perform related computations. □ □ **A2.** Linear map verification. I can determine if a map between vector spaces of polynomials 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 a basis for the kernel and a basis for the image of a linear map. What algebraic structure do matrices have? \square \square M1. Matrix Multiplication. I can multiply matrices. \square 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. Row operations. I can represent a row operation as matrix multiplication, and compute how the operation affects the determinant. \square G2. Determinants. I can compute the determinant of a square matrix.

□ G4. Eigenvectors. I can find a basis for the eigenspace of a square matrix associated with a given eigenvalue.

 \square G3. Eigenvalues. I can find the eigenvalues of a 2 × 2 matrix.