The midterm will consist of filling in definitions, completing the statements of certain theorems, and being able to prove certain theorems and exercises. The pools for each of these is as follows.

Definitions to know:

- linear map, linear operator
- sum, scalar multiplication, and product of linear maps
- null space, range
- injective, surjective
- matrix of a linear map, matrix of a vector
- sum, scalar multiplication, and product of matrices
- invertible linear map, isomorphism, isomorphic
- invariant subspace
- eigenvalue, eigenvector
- inner product, inner product space
- norm
- orthogonal
- orthonormal

Be careful that you know the definitions of these terms, rather than just the criteria for checking certain terms. For example, the definition for \( T \in \mathcal{L}(V,W) \) to be invertible is that there exists \( S \in \mathcal{L}(W,V) \) such that \( ST = I_V \) and \( TS = I_W \). The definition is not that \( T \) is injective and surjective. Additionally, to understand and use these definitions, you must be familiar with the definitions from the first half of the course.

Be able to complete the statements of the theorems from the text (see the text for the statements of these theorems):

- 3.5, 3.16, 3.22, 3.56, 6.7, 6.25

Be able to prove the theorems from the text (see the text for the statements of these theorems):


Be able to prove the exercises from the text:

- 3.A #’s 11
- 3.B #’s 6, 9
- 3.C #’s 2
- 5.A #’s 1, 6

In your proofs you may need to use theorems from the first half of the course. As an example, many proofs start with \( U \) being a subspace of \( V \), so you take a basis for \( U \) and then extend that to a basis for \( V \). That you can do this is a theorem you may assume.