Reading Assignment 7

Read Sect. 2.4 and 2.5

1. Is it possible to always find an inverse for a linear transformation? Why or why not?
2. How is the inverse of a linear transformation defined?
3. Is it possible for a linear transformation to have two inverses? Why or why not?
4. What facts hold for invertible transformations?
5. If T is linear and T^{-1} exists, what can you say about T^{-1}?
6. If $T : V \to W$ is linear and $\dim(V) = \dim(W)$, what conditions are equivalent? How does it follow from Theorem 2.5 (p. 71)?
7. What does it mean for an $n \times n$ matrix to be invertible? Compare with the definition of linear transformation, are there any similarities?
8. Is it possible for an invertible linear transformation T to map V to W and $\dim(V) \neq \dim(W)$? Explain your answer.
9. If T is an invertible linear transformation between finite dimensional vector spaces, what can you say about $[T]_\beta^\gamma$?
10. What is the inverse of L_A when it exists?
11. How is an isomorphism defined? How do we prove that a linear transformation is an isomorphism?
12. If $\dim(V) = \dim(W)$, what can you conclude about V and W?
13. If you are told that V is isomorphic to W, what can you conclude?
14. What does Theorem 2.20 say? A consequence of this theorem is the dimension of $\mathcal{L}(V, W)$, what is the dimension? Explain.
15. What is the standard representation of V with respect to β?

Practice Problems: Sect. 2.4 # 1, 2, 4, 5.

Questions for Section 2.5

1. What is the objective of Sect. 2.5?
2. Describe the matrix that allows you to go from one coordinate system to another? Be as specific as possible.
3. How do we define the change of coordinate matrix?
4. What are the properties of the change of coordinate matrix described in Theorem 2.21?
5. According to Theorem 2.22, what is the relationship between $[T]_\beta$ and $[T]_{\beta'}$?
6. What does it mean for two matrices to be similar?

Practice Problems: Sect. 2.5 # 1, 2, 3, 4, 6