

Review for Test 1

The test covers Sections 1.1 – 1.5, 1.7 – 1.9.

As I reviewed in class, this chapter has two main points: 1) understanding linear systems and their solutions without context, and 2) introducing key linear algebra concepts in terms of vector spaces and relate the concepts to solving linear systems.

Whatever the question asks, you must first write down the meaning of what you are trying to show, using definition. This should identify conditions/equations to be verified. Then relate this to solving linear system. You should then explain the relation of the solution sets of the linear system you obtained to the question you are trying to answer.

- Definitions: Ax , linear combinations, span, linear independence, linear transformation, standard matrix of a linear transformation, onto, one-to-one.
- Need to know how to quote theorems in showing work. I do not expect you to remember theorem numbering but give small excerpts of the part of the theorem you use.
- Important skills (not-exhaustive):
 - Determine when a system is consistent. Express general solution in parametric vector form.
 - Determine values of parameters that make a system consistent, or have unique solution etc. Describe existence and uniqueness of solutions of **linear systems** in terms of pivot positions of **matrices**.
 - Determine when homogeneous system have non-trivial solutions.
 - Determine when a vector is in a span of specified vectors. Express a vector as a linear combination of specified vectors.
 - Determine whether a vector is in the range of a linear transformation.
 - Determine whether a linear transformation is onto or one-to-one.
 - Determine whether the columns of an $m \times n$ matrix span \mathbb{R}^m . Determine whether the columns are linear independent.
 - Determine whether a set of vectors is linearly independent. Know how to use theorems to decide, on top of solving linear systems.
 - Find the standard matrix of a linear system.