
1 Vector Spaces

Learning Outcomes

After completing this chapter, students should be able to do the following.

- Use axioms for abstract vector spaces (over the real or complex fields) to discuss examples (and non-examples) of abstract vector spaces such as subspaces of the space of all polynomials.
- Discuss the existence of a basis of an abstract vector space.
- Describe coordinates of a vector relative to a given basis.
- For a linear transformation between vector spaces, discuss its matrix relative to given bases.
- Discuss how the matrix of a linear transformation with respect to a basis changes when the basis is changed.
- Discuss the advantages of a change of basis that leads to a simplified matrix and simplified description of a linear map.