MATH-332: Linear Algebra Chapter: 3

Determinants

Section 3.3: Cramer's Rule, Volume, Linear Transformations

pgs. 201 - 209 *July 3, 2009*

Lecture: Cramer's Rule, Volume, Linear Transformations

Topics:
- Cramer's Rule
- An Inverse Formula
- Determinants as Volumes
- Linear Transformations in $\mathbb{R}^2$, $\mathbb{R}^3$

Problems

Prac: 1

Prob: 5, 7, 13, 17, 19, 25

Section Goals

- Understand the proof of Cramer's Rule and how this theorem can be used to construct an element level description of inverse of a nonsingular matrix.
- Interpret the determinant geometrically as the volume of the parallelepiped induced by the vectors, which make up the columns of a matrix.

Section Objectives

- Prove Cramer's Rule, theorem 3.7 page 201, through the use of properties of determinants thus giving an element level description of the solution to a square linear system with nonsingular coefficient data.
- Using Cramer's rule and the definition of matrix products to prove theorem 3.8, which gives an element level description of an inverse matrix.
- State the implications of theorem 3.9, which says that the determinant is related to a unsigned spanned area use this and theorem 3.10 on page 207 to discuss how the determinant can be used to calculate the way linear transformations change areas.