

MATH-332: Linear Algebra

Chapter: 3

DeterminantsSection 3.2: Properties of Determinants

pgs. 192 - 198

July 3, 2009

Lecture: Properties of Determinants**Topics:**

Elementary row operations  
 Invertibility Criterion using determinants  
 Properties for transposes and products

**Problems**

Prac: 1, 2  
 Prob: 5, 7, 13, 25, 27

**Section Goals**

- Understand how row-operations effect determinants, theorem 3.3 page 192, and how echelon forms can be used to expedite the calculation of determinants via theorem 2 on page 189.
- Relate the value of a matrices determinant to the invertibility of the matrix using echelon forms.
- Understand the properties of the determinant function on transposed matrices and products of matrices.

**Section Objectives**

- State theorem 3.3, which classifies how elementary row-operations change the determinant of a matrix and highlight these facts with examples.
- Using these examples justify the validity of theorem 3.4 on page 194, which states that a matrix is invertible if and only if its determinant is nonzero.
- Prove theorem 3.5 on page 196, which says that the determinant of a matrix transpose is equal to the determinant of the matrix itself. Highlight that this allows us to change the word 'row' to the word 'column' in theorem 3.3.
- Use theorem 3.3 and the correspondence between elementary matrices and row-operations to justify theorem 6, which says that the determinant of a product is the product of determinants. Note that homework 5 problem 1 provides an example for when determinants of sums can be written as sums of determinants.