

# Homework 1, Section 5.2: 21, 22, 23

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April 11, 2014

## Homework

### 21. A)

False. If a matrix is not invertible then its determinant is zero. By the invertible Matrix Theorem, then

### 21. B)

False. This contradicts the properties of a determinant (see theorem 3).

### 21. C)

True. This contradicts the properties of a determinant (see theorem 3).

### 21. D)

False. Example 4 proves this wrong.

### 22. A)

False. When  $A$  is a  $3 \times 3$  matrix,  $\det A$  turns out to be the volume of the parallelepiped determined by the columns of  $a_1, a_2, a_3$

### 22. B)

False. This contradicts the properties of a determinant (see theorem 3).

### 22. C)

True. In general, the algebraic multiplicity of an eigenvalue is its multiplicity as a root of the characteristic equation.

### 22. D)

False. The slightly incorrect warning on page 277 shows this.

**23.**

If  $A = QR$ , with  $Q$  invertible, and if  $A_1 = RQ$  then  $A_1 = Q^{-1}QRQ = Q^{-1}AQ$  which shows that  $A_1$  is similar to  $A$