

Name : _____

Homework #9

Math 301, Spring 2013

Due Wednesday, April 17, 2013

Show all of your work!

1. Compute the determinant of A

$$A = \begin{bmatrix} 1 & 3 & -11 & 27 \\ 0 & 2 & 7 & 0 \\ 1 & -3 & 0 & 5 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

2. Compute the determinant of A in two different ways. First, compute it using a co-factor expansion. Second, row-reduce A to show that the determinant is the product of its pivots.

$$A = \begin{bmatrix} -1 & 7 & 3 \\ 0 & -2 & 5 \\ -2 & 7 & 0 \end{bmatrix}$$

3. Show that the inverse of a 2×2 matrix A can be written as

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}^{-1} = \frac{C^T}{\det(A)}$$

where C is the co-factor matrix of A . Show that this remarkable formula for computing the inverse of a 2×2 matrix can be used to compute the inverse of a 3×3 matrix A .

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}, \quad A^{-1} = \frac{1}{4} \begin{bmatrix} 3 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

In fact, this formula can be used to compute the inverse of any invertible matrix A , and extends the familiar formula for the 2×2 case.

4. Show that the determinant of A is unaffected by the value of x :

$$A = \begin{bmatrix} 1 & 1 & x \\ 1 & 2 & 2 \\ 1 & 2 & 5 \end{bmatrix}$$