

Math 304 (Spring 2015) - Homework 3

Problem 1.

Compute the following determinants:

$$\begin{vmatrix} 6 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 2 & 1 \end{vmatrix}, \quad \begin{vmatrix} 2 & 3 & 0 & 2 \\ 4 & 3 & 2 & 1 \\ 6 & 0 & 0 & 3 \\ 7 & 0 & 0 & 4 \end{vmatrix}, \quad \begin{vmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{vmatrix}$$

Problem 2.

Compute the determinant

$$\begin{vmatrix} 0 & 7 & 5 & 3 \\ 1 & 1 & 2 & 1 \\ 1 & 1 & 2 & -1 \\ 1 & 1 & 1 & 2 \end{vmatrix}$$

Problem 3.

Use the adjoint to find the inverse of the following matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 0 \\ 4 & 5 & 6 \end{bmatrix}$$

Problem 4.

Let A be an $n \times n$ matrix and α a scalar. Show that

$$\det(\alpha A) = \alpha^n \det(A).$$

(Hint: can we obtain the matrix (αA) from the matrix A by a sequence of elementary row operations?)

Problem 5.

If A and B are 4×4 matrices with $\det(A) = 4$ and $\det(B) = 3$. Find the value

- (a) $\det(AB)$
- (b) $\det(2A)$
- (c) $\det(A^{-1}B)$