

**MTH 237-60**

**Name:**

*Homework 2. Applications of matrix algebra*

Due Tuesday 6/7 at the beginning of class.

1. Show that the inverse of

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

is

$$\frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}.$$

2. If  $A$  is a square matrix and  $\lambda$  ("lambda") is a nonzero real number, show that  $(\lambda A)^{-1} = (1/\lambda)A^{-1}$ . *Hint:* Use the fact that for compatible matrices  $A$  and  $B$  and real numbers  $\lambda$ , we have  $A(\lambda B) = \lambda AB$ .

3. Let

$$A = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}.$$

This matrix has the interpretation

$$A_{i,j} = \begin{cases} 1 & \text{if a grave labeled } i \text{ contains pottery labeled } j \\ 0 & \text{otherwise.} \end{cases}$$

Compute  $G = AA^t$ . What is the meaning of its off-diagonal entries? Which of them is the biggest and what does that mean?