LINEAR ALGEBRA
— MA 242 —

Extra Credit

HW 8

1 .

Let M be a square matrix with zeros of the main diagonal and ones everywhere else. Compute the inverse of such a matrix using your favorite software package or www.wolframalpha.com for the case $n = 3, 4, 5, 6$ and make a conjecture about the general formula for any dimension.

2a .

Compute the determinant of the following matrix.

$$\begin{bmatrix} 1 & 1 & 1 & \ldots & 1 \\ 1 & 2 & 2 & \ldots & 2 \\ 1 & 2 & 3 & \ldots & 3 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & 2 & 3 & \ldots & n \end{bmatrix}$$

2b .

Compute the determinant of the following matrix.

$$\begin{bmatrix} 1 & 1 & 1 & \ldots & 1 \\ 1 & 3 & 3 & \ldots & 3 \\ 1 & 3 & 6 & \ldots & 6 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & 3 & 6 & \ldots & 3(n-1) \end{bmatrix}$$

3 .

Compute the determinant of the following matrix.

$$\begin{bmatrix} 1 & \alpha_1 & \alpha_1^2 & \ldots & \alpha_1^{n-1} \\ 1 & \alpha_2 & \alpha_2^2 & \ldots & \alpha_2^{n-1} \\ 1 & \alpha_3 & \alpha_3^2 & \ldots & \alpha_3^{n-1} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & \alpha_n & \alpha_n^2 & \ldots & \alpha_n^{n-1} \end{bmatrix}$$