MATH 260, Homework 6, Spring '14
Due: February 21, 2014
Honor Code:

Name: KEY

1) (10 pts) Do problem 19 from section 3.4 of the textbook on page 164.

$$\begin{vmatrix} 6 & 22 & 0 & -3 \\ 0 & -1 & 0 & 4 \\ 0 & 0 & 13 & 0 \\ 0 & 0 & 0 & 4 \end{vmatrix} = (6)(-1)(13)(4) = -312$$

↑ since this matrix is upper triangular (meaning it's all 0's below the diagonal), its det. is the product of the diagonal entries

2) (15 pts) Do problem 26 from section 3.4 of the textbook on page 165.

$$\begin{vmatrix} 1 & -4 & 2 & -2 \\ 4 & 7 & -3 & 5 \\ 3 & 0 & 8 & 0 \\ -5 & -1 & 6 & 9 \end{vmatrix}$$

expand across row 3 for the most 0s

$$= (3)(-1)^{3+1}\begin{vmatrix} -4 & 2 & -2 \\ 7 & -3 & 5 \\ -1 & 6 & 9 \end{vmatrix} + 0 + (8)(-1)^{3+3}\begin{vmatrix} 1 & -4 & -2 \\ 4 & 7 & 5 \\ -5 & -1 & 9 \end{vmatrix} + 0$$

↖ expand across 1st row ↗

$$= 3\left(-4(-1)^{1+1}\begin{vmatrix} -3 & 5 \\ 6 & 9 \end{vmatrix} + 2(-1)^{1+2}\begin{vmatrix} 7 & 5 \\ -1 & 9 \end{vmatrix} + -2(-1)^{1+3}\begin{vmatrix} 7 & -3 \\ -1 & 6 \end{vmatrix}\right)$$

$$+ 8\left(1(-1)^{1+1}\begin{vmatrix} 7 & 5 \\ -1 & 9 \end{vmatrix} + -4(-1)^{1+2}\begin{vmatrix} 4 & 5 \\ -5 & 9 \end{vmatrix} + -2(-1)^{1+3}\begin{vmatrix} 4 & 7 \\ -5 & -1 \end{vmatrix}\right)$$

$$= 3\left(-4(-57) - 2(68) - 2(39)\right) + 8\left((1)(68) + 4(61) - 2(31)\right)$$

$$= \underline{2042} \neq 0, \text{ so the matrix is invertible.}$$

(it's non-singular)