# Math115 Test 2

## February 4th, 2009

Answer all parts of the questions and give complete reasons and checks for your answers. The parts of the questions are weighted as shown in square brackets on the right.

1. (a) Use Laplace expansions to evaluate the determinant of this matrix: [5]

$$B := \begin{pmatrix} -1 & 1 & 1 & 0 \\ -1 & 0 & 0 & 1 \\ 0 & -1 & 1 & -1 \\ -1 & 0 & 1 & 0 \end{pmatrix}$$

   (b) If you were to try to find the inverse of $B$ using row operations, show how it would start and explain how it then fails. [5]

2. (a) For which value of $x$ is $C$ guaranteed to be non-singular? [4]

$$C := \begin{pmatrix} 4 & 6 & 5 \\ y & 3 & 4 \\ 7 & 6 & x \end{pmatrix}$$

   (b) Use (a)'s answer to say which value of $y$ will make $C$ singular when $x = -4$. [1]

   (c) Solve this equation for $W$ and explain what sizes $F$ and $W$ must be for $W$ to have a unique solution if $E$ is $3 \times n$.

$$2EW(F^2) = (E^T F)^2$$

   Find $\det(W)$ if $\det(E) = 5$ and $\det(F) = 6$. [5]