# Math115 Test 3

February 15, 2007

Answer all questions and give complete reasons and checks for your answers. The parts of the questions are weighted as shown spend an appropriate amount of time on each part. The questions can be answered in any order, please start a fresh side of your paper for each question.

1. (a) Find the value of $y$ which guarantees that $A$ will be non-singular. [6]

$$A := \begin{pmatrix} 5 & -6 & y \\ x & 2 & 2 \\ 2 & 2 & 7 \end{pmatrix}$$

   (b) Using $x := -3$ now, find the $y$ value which will make $A$ singular. [1]

   (c) Find the rank of $A$ with the values of $x$ and $y$ from part (b). [3]

2. (a) Find the eigenvalues of this matrix: [6]

$$B := \begin{pmatrix} 79 & -80 & -60 \\ 40 & -41 & -60 \\ 8 & -16 & 27 \end{pmatrix}$$

   (b) Find all eigenvectors belonging to the eigenvalue of multiplicity 2. [4]