

# Math115 Test 1

January 26th, 2010

Answer all part of the question and give complete reasons and checks for your answers. Attach all rough working and do not erase anything that might earn you marks. The parts of the questions are weighted as shown in square brackets on the right.

1. Use row operations to take this system of equations to Reduced Row Echelon Form and find and check whether or not the solutions you get are correct. [10]

$$\begin{pmatrix} -3 & 1 & -2 & -2 \\ -1 & -1 & -1 & 2 \\ 2 & -2 & 1 & 1 \\ 1 & -3 & 0 & 2 \end{pmatrix} \begin{pmatrix} w \\ x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 3 \\ -5 \\ 1 \\ -1 \end{pmatrix}$$

2. (a) Use algebra step by step to make matrix  $X$  the subject of this expression, assuming inverses exist where necessary. [4]

$$(AXB + A) = 2AC$$

- (b) Check your answer with these matrices, choosing a not all zero matrix for  $A$ : [3]

$$B := \begin{pmatrix} 2 & 5 \\ 3 & 7 \end{pmatrix}, \quad C := \begin{pmatrix} 1 & 1 \\ 2 & 2 \end{pmatrix}$$

- (c) If  $A$  was a  $1 \times 2$  matrix, what sizes would  $B$ ,  $C$  and  $X$  be forced to be to make them all multipliable and so potentially have a solution? Give an  $A$  of this size which would have a solution for  $X$ . [3]