

Math115 Test 1

January 17, 2007

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

1. (a) Find the unique solution for these equations by getting to Reduced Row Echelon Form. [8]

$$\begin{aligned}2x - 3y + 5z &= 3 \\5x - y - 5z &= 5 \\3x + 2y - 8z &= 6\end{aligned}$$

- (b) What would the general solution to $5x - y - 5z = 5$ be in terms of $\begin{pmatrix} x \\ y \\ z \end{pmatrix}$? [2]

2. We are given the following matrices.

$$A := \begin{pmatrix} -3 & 2 & 3 \\ -2 & -2 & 0 \end{pmatrix}, \quad B := \begin{pmatrix} -2 & 3 \\ -1 & -1 \end{pmatrix}, \quad C := \begin{pmatrix} -3 & -2 \\ 0 & 3 \\ -1 & 2 \end{pmatrix}$$

- (a) Determine whether the compound matrices below exist and either explain why not or find the answer. [5]
- i. $2A - C^T$
 - ii. B^2
 - iii. $B + AC$
 - iv. $A^T C$
- (b) Find X in terms of D , E and F if $3(D - \frac{1}{2}X)^T = FE$, showing and identifying each step of algebraic simplification. What restriction on the sizes of D , E and F are there if X is $m \times n$? [5]