

Math115 2011 Test 2

February 2nd, 2011

Answer all questions and give complete reasons and checks for your answers. Please do not erase anything, just put a line through your work and continue; you cannot lose marks for anything you write. The parts of the questions are weighted as shown and can be answered in any order.

1. (a) Use the rules of matrix algebra to solve this for X , assuming inverses exist where necessary. [4]

$$A(2XB - 3B^T) = CB$$

- (b) Substitute these matrices into your solution and check whether or not your X contains only integers. [5]

$$A := \begin{pmatrix} 5 & 4 \\ 3 & 2 \end{pmatrix}, \quad B := \begin{pmatrix} 3 & 2 \\ 1 & 1 \end{pmatrix}, \quad C := \begin{pmatrix} 0 & 1 \\ 2 & 1 \end{pmatrix}$$

- (c) Explain how the equation in (a) simplifies if you substitute $B = I$. Now choose any 2×2 matrix of rank 1 for A and find a C such that X would have solutions. [3]

2. (a) Use row operations to find the inverse of E : [7]

$$E := \begin{pmatrix} 4 & 3 & 0 \\ 1 & 4 & 1 \\ -1 & 4 & 2 \end{pmatrix}$$

- (b) Use your inverse to find F in the matrix equation $EF = \begin{pmatrix} 6 \\ 0 \\ -1 \end{pmatrix}$. [1]