Math1204 Test 2

January 24$^{\text{th}}$, 2018

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) Find the inverse of matrix M using row operations on the 4×8 matrix of M augmented with the identity matrix.

$$M := \begin{pmatrix} 1 & 2 & 1 & 1 \\ 2 & 0 & 1 & 1 \\ 2 & 1 & 2 & 1 \\ 2 & 0 & 0 & 1 \end{pmatrix}$$

[8]

(b) Explain why the determinant of a 2×2 matrix made from integers between 1 and n is less than n^2, and experiment to find a 3×3 matrix with elements either 1 or 2 which has determinant at least 4. [2]

2. For this question let $B := \begin{pmatrix} 4 & 6 & y \\ 0 & x & -2 \\ 2 & -5 & 3 \end{pmatrix}$.

(a) Evaluate the determinant of B using a cofactor expansion. [3]

(b) For which value of y is B guaranteed to be non-singular whatever value of x is chosen? [2]

(c) Now, letting $x = 8$ and $y = 2$, use row operations to find the homogeneous solution to $BV = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ [5]