

Math1204 Test 3 2015

February 10th, 2015

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 all three eigenvalues of M by using a Laplace expansion to get a cubic polynomial, find a root by trial substitution and then use polynomial division to factor the polynomial.

$$M := \begin{pmatrix} 11 & -28 & 8 \\ 10 & -22 & 4 \\ 2 & -2 & -7 \end{pmatrix}$$

[8]

- (b) Choose one of the eigenvalues of M that you found (or ask me for one if you didn't find any) and determine the integer valued eigenvector corresponding to this eigenvalue. [4]

2. (a) Find both eigenvalues and eigenvectors of this matrix.

$$A := \begin{pmatrix} 20 & -5 \\ 14 & 3 \end{pmatrix}$$

[4]

- (b) Use diagonalisation to get an expression for A^k and use this to identify for which smallest integer value of k is there an entry in A^k which is over 1000000. [4]