

## ASSIGNMENT 4, MP204/MP274, 1st Semester 1999

Please hand in this assignment either in the tutorial *to the lecturer*, or *place in the box labelled MP204/274 ASSIGNMENT 4*, outside Room 424 Priestley Building, by 5pm Friday 28th May 1999.

1. Let  $A = \begin{bmatrix} -3 & 3 & -2 \\ -7 & 6 & -3 \\ 1 & -1 & 2 \end{bmatrix}$ .

(a) Given that  $ch_A(x) = (x - 2)^2(x - 1)$ , find the Jordan form  $J_A$ .

(b) Find a non-singular matrix  $P$  such that  $P^{-1}AP = J_A$ .

2. Find the  $8 \times 8$  Jordan forms  $A$  and  $B$  such that

$$ch_A(x) = x^8, \text{ nullity } A = 4, \text{ nullity } A^2 = 7;$$

$$ch_B(x) = x^8, \text{ nullity } B = 4, \text{ nullity } B^2 = 5.$$

3. Let  $A = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 \\ -1 & -1 & -1 & -1 \end{bmatrix}$ . Given that  $ch_A(x) = x^4$  and  $A^2 = 0$ ,

(a) perform the block upper triangular form algorithm on  $A$  and find a non-singular  $P$  such that  $P^{-1}AP$  is in block upper triangular form;

(b) find the Jordan form  $J_A$ ;

(c) find a non-singular matrix  $P$  such that  $P^{-1}AP = J_A$ .