

Math 5032 - Homework 4

Due 2/24/06

Find the characteristic polynomial, invariant factors, elementary divisors, rational canonical form, and Jordan canonical form (when possible) over \mathbb{Q} for each of the following matrices:

1. $\begin{pmatrix} 0 & -4 \\ 1 & -4 \end{pmatrix}$

2. $\begin{pmatrix} c+6 & -9 \\ 4 & c-6 \end{pmatrix}, c \in \mathbb{Q}$

3. $\begin{pmatrix} 3 & -2 & -4 \\ 0 & 2 & 4 \\ 0 & -1 & -2 \end{pmatrix}$

4. $\begin{pmatrix} -2 & 3 & -2 \\ -1 & 2 & -1 \\ 0 & 1 & 0 \end{pmatrix}$

5. $\begin{pmatrix} 1 & 0 & -2 \\ 2 & 6 & 8 \\ -1 & -3 & -4 \end{pmatrix}$

6. $\begin{pmatrix} 1 & 0 & 0 \\ -4 & 7 & -4 \\ -8 & 12 & -7 \end{pmatrix}$

7. $\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$

$$8. \begin{pmatrix} 3 & 2 & -1 \\ -2 & -2 & 2 \\ -1 & -5 & 5 \end{pmatrix}$$

$$9. \begin{pmatrix} 0 & -1 & 2 \\ 3 & 8 & -14 \\ 3 & 6 & -10 \end{pmatrix}$$

$$10. \begin{pmatrix} 4 & -2 & -1 \\ 5 & -2 & -1 \\ -2 & 1 & 1 \end{pmatrix}$$

$$11. \begin{pmatrix} -2 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 \\ 2 & 0 & 1 & -2 \\ -1 & 0 & 0 & 0 \end{pmatrix}.$$

$$12. \begin{pmatrix} 1 & 0 & 1 & 0 \\ 4 & 3 & -2 & 0 \\ -2 & 1 & 5 & 0 \\ 2 & 0 & -1 & 3 \end{pmatrix}.$$