

Course 2E2 2008-09 (SF Engineers & MSISS & MEMS)**S h e e t 11**

Due: at the end of the tutorial

Exercise 1

Find the characteristic polynomials of the following matrices:

(i) $\begin{pmatrix} -2 & 0 \\ 0 & -1 \end{pmatrix};$

(ii) $\begin{pmatrix} 0 & 2 \\ -9 & 0 \end{pmatrix};$

(iii) $\begin{pmatrix} 1 & 1 & 11 \\ 0 & -3 & 2 \\ 0 & 0 & 0 \end{pmatrix};$

(iv) $\begin{pmatrix} 0 & -1 & 1 \\ 0 & -1 & 2 \\ 0 & 2 & 1 \end{pmatrix}.$

Exercise 2

Find the eigenvalues and corresponding eigenvectors of the following matrices:

(i) $\begin{pmatrix} -1 & 0 \\ 1 & 5 \end{pmatrix};$

(ii) $\begin{pmatrix} 1 & -1 & 1 \\ 0 & 1 & 2 \\ 0 & 1 & 2 \end{pmatrix};$

(iii) $\begin{pmatrix} 1 & -1 & 1 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 1 & 2 & 0 \end{pmatrix};$

Exercise 3

Find a matrix P that diagonalizes each matrix A in Exercise 2 and determine the corresponding diagonal matrix $D = P^{-1}AP$.