March 16, 2013 Lecturer Dmitri Zaitsev Hilary Term 2014

Course 2E02 2014 (SF Engineers & MSISS & MEMS)

S h e e t 8

Due: at the end of the tutorial

Exercise 1

Find the eigenvalues and corresponding eigenvectors of the following matrices:

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

(ii) $\begin{pmatrix} 1 & 1 & 1 \\ 0 & 2 & 3 \\ 0 & -2 & -3 \end{pmatrix}$.

Exercise 2

Find matrix P and diagonal matrix D diagonalizing A, i.e. $P^{-1}AP = D$, where A is as in Exercise 2.

Exercise 3

Find the Fourier series of the function

$$f(x) = \begin{cases} 2 \text{ if } -\pi \le x < 0 \\ -1 \text{ if } 0 \le x \le \pi; \end{cases}, \quad -\pi \le x \le \pi.$$