

Course 2E01 2017 (SF Engineers & MSISS & MEMS)**S h e e t 9**

Due: at the end of the tutorial

Exercise 1

Find the eigenvalues and corresponding eigenvectors of the following matrix:

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

Exercise 2

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

Exercise 3

Use Exercise 2 to solve the system of ordinary differential equations

$$\begin{pmatrix} y_1' \\ y_2' \\ y_3' \end{pmatrix} = A \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix},$$

where A is as in Exercise 1.

Exercise 4

Find the Fourier series representation of the function $f(x)$ for $-\pi \leq x \leq \pi$, where

$$f(x) = x + 1.$$