Course 2E02 2015 (SF Engineers & MSISS & MEMS)

S h e e t 7

Due: at the end of the tutorial

Exercise 1

Use the Gram-Schmidt process to transform the given basis into orthogonal one:

(i) $\mathbf{u}_1 = (-1, 0)$, $\mathbf{u}_2 = (1, 4)$;

(ii) $\mathbf{u}_1 = (1, 0, -1)$, $\mathbf{u}_2 = (0, 0, 1)$, $\mathbf{u}_3 = (1, 2, 1)$;

Exercise 2

Find the least squares approximate solution of the linear system:
$$\begin{cases} x = 1 \\ y = 0 \\ y + z = 1 \\ x - y + z = 0 \end{cases}.$$

Exercise 3

Find the characteristic polynomials of the following matrices:

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

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

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