

Course 2E02 2010 (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) $\mathbf{u}_1 = (-1, 0)$, $\mathbf{u}_2 = (1, 1)$;
- (ii) $\mathbf{u}_1 = (-1, 0, -1)$, $\mathbf{u}_2 = (1, 1, 0)$, $\mathbf{u}_3 = (2, 0, 1)$;

Exercise 2

Find the least squares approximate solution of the linear system:

$$\begin{cases} x = -1 \\ y = -1 \\ z = -1 \\ x + y + z = 0 \end{cases}.$$

Exercise 3

Find the characteristic polynomials of the following matrices:

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