

MAU22E01 2020 (SF Engineers & MSISS & MEMS)**S h e e t 7**

Practice sheet - will not be marked

It is important to be able to do all the problems, including unmarked ones, to ensure you are prepared for the exam.

Exercise 1

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

- (i) $\mathbf{u}_1 = (0, 1)$, $\mathbf{u}_2 = (2, -3)$;
- (ii) $\mathbf{u}_1 = (1, 0, 1)$, $\mathbf{u}_2 = (0, 0, 1)$, $\mathbf{u}_3 = (2, -1, 0)$.

Exercise 2

Find the characteristic polynomials of the following matrices:

- (i) $\begin{pmatrix} -1 & 5 \\ 0 & 1 \end{pmatrix}$;
- (ii) $\begin{pmatrix} 0 & -2 \\ -1 & 0 \end{pmatrix}$;
- (iii) $\begin{pmatrix} -1 & 2 & 1 & 3 \\ 0 & 2 & -2 & -1 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 2 & -1 \end{pmatrix}$;
- (iv) $\begin{pmatrix} 1 & 2 & 0 \\ 0 & 1 & 2 \\ 1 & -1 & 1 \end{pmatrix}$.