

Course 2E1 2006-07 (SF Engineers & MSISS & MEMS)**S h e e t 18**

Due: at the end of the tutorial

Exercise 1

Find the coordinates of the vector $\mathbf{v}$ with respect to the basis $\mathbf{v}_1, \dots, \mathbf{v}_n$ (i.e. the coefficients $c_1, \dots, c_n$ in the representation $\mathbf{v} = c_1\mathbf{v}_1 + \dots + c_n\mathbf{v}_n$):

- (i) $\mathbf{v} = (2, 5)$, $\mathbf{v}_1 = (2, 1)$, $\mathbf{v}_2 = (1, -2)$;
- (ii) $\mathbf{v} = (2, -1, 3)$, $\mathbf{v}_1 = (-1, 1, 0)$, $\mathbf{v}_2 = (1, 1, 0)$, $\mathbf{v}_3 = (1, 1, -2)$;
- (iii) $\mathbf{v} = (1, 2, 1, 2)$, $\mathbf{v}_1 = (1, 0, 0, 0)$, $\mathbf{v}_2 = (1, 1, 0, 0)$, $\mathbf{v}_3 = (0, 0, 2, 0)$, $\mathbf{v}_4 = (1, 1, 1, 1)$.

Exercise 2

Find bases and dimensions for the row, column and null spaces of the matrix:

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