

**Course 2E2 2007-08 (SF Engineers & MSISS & MEMS)****S h e e t 7**

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Due: at the end of the tutorial

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**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)  $\mathbf{v} = (2, -1, 4)$ ,  $\mathbf{v}_1 = (1, -1, 0)$ ,  $\mathbf{v}_2 = (1, 1, 0)$ ,  $\mathbf{v}_3 = (1, -1, 2)$ ;
- (iii)  $\mathbf{v} = (1, 2, 1, 2)$ ,  $\mathbf{v}_1 = (1, 0, 0, 0)$ ,  $\mathbf{v}_2 = (1, 1, 0, 0)$ ,  $\mathbf{v}_3 = (0, 0, 6, 0)$ ,  $\mathbf{v}_4 = (1, -1, 1, 1)$ .

**Exercise 2**

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

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