

**Course 2E2 2008-09 (SF Engineers & MSISS & MEMS)****S h e e t 3**

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Due: at the end of the tutorial

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**Exercise 1**

Determine which of the following are subspaces of  $\mathbb{R}^3$ :

- (i) the set of all vectors of the form  $(-a, a, 0)$ ;
- (ii) the set of all vectors of the form  $(1, -1, a)$ ;
- (iii) the set of all vectors of the form  $(b, 3b, -a)$ .

**Exercise 2**

Determine whether the vectors span  $\mathbb{R}^3$ :

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

Determine whether the vectors span  $\mathbb{R}^4$ :

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