

**Course 2E01 2015 (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**

- (i) Find parametric equations for the line spanned by the vector:

$$\mathbf{u} = (1, -3, 2);$$

- (ii) Give a system of linear equations that determines the line in (i).  
(iii) Find an equation for the plane generated (spanned) by the vectors:

$$\mathbf{u} = (1, 1, -2), \quad \mathbf{v} = (-1, 3, 0).$$

**Exercise 2**

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

- (i) the set of all vectors of the form  $(0, a, -2a)$ ;  
(ii) the set of all vectors of the form  $(2, 0, a)$ ;  
(iii) the set of all vectors of the form  $(a, b, -2b)$ .

**Exercise 3**

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

- (i)  $\mathbf{v}_1 = (1, 3, 6)$ ,  $\mathbf{v}_2 = (3, 4, 2)$ ,  $\mathbf{v}_3 = (-1, 0, 0)$ ;

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

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