

Course 2E1 2004-05 (SF Engineers & MSISS & MEMS)

S h e e t 14

Due: in the tutorial sessions next Wednesday/Thursday

Exercise 1

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

- (i) the set of all vectors of the form $(0, 0, a)$;
- (ii) the set of all vectors of the form $(0, 1, a)$;
- (iii) the set of all vectors of the form (a, b, c) , where $a + b = c$;
- (iv) the set of all solutions (x, y, z) of the system $x + 2y = 0$, $z - 4y = 0$.

Exercise 2

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

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

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

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

Exercise 3

Find parametric equations for the line spanned by the vector:

- (i) $\mathbf{u} = (1, 0, 3)$;
- (ii) $\mathbf{u} = (1, 0, 3, 0, 5)$;

Find an equation for the plane spanned by the vectors:

- (ii) $\mathbf{u} = (1, 0, 3)$, $\mathbf{v} = (-1, 0, 3)$;