February 27, 2006 Lecturer Dmitri Zaitsev Hilary Term 2006

Course 2E1 2005-06 (SF Engineers & MSISS & MEMS)

S h e e t 15

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 $(a, 0, a)$;

(ii) the set of all vectors of the form $(a, 5, a)$;

Exercise 2

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

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

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

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

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

Exercise 3

Find parametric equations for the line spanned by the vector:

(i) $\mathbf{u} = (2, 1, 0)$;

(ii) $\mathbf{u} = (2, 1, 0, 1, 5)$;

Find an equation for the plane spanned by the vectors:

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