February 9, 2010 Lecturer Dmitri Zaitsev Hilary Term 2010

Course 2E02 2010 (SF Engineers & MSISS & MEMS)

S h e e t 3

Due: at the end of the tutorial

Exercise 1

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

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

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

(ii) $\mathbf{v}_1 = (1, 0, -3, 1)$, $\mathbf{v}_2 = (1, 0, 2, 0)$, $\mathbf{v}_3 = (2, 0, 4, 0)$, $\mathbf{v}_4 = (0, 0, -5, 1)$.

Exercise 2

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

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

(ii) Give two equations that determine the line in (i).

(iii) Find an equation for the plane spanned by the vectors:

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

Exercise 3

Which of the following sets of vectors are linearly dependent?

(i) $(0, -1)$, $(0, 2)$;

(ii) $(0, 1, 1)$, $(1, 1, 0)$, $(1, 1, 1)$;

(iii) $(0, 0, 0, 0, 0)$, $(1, 1, -1, 1, 1)$.