February 3, 2012 Lecturer Dmitri Zaitsev Hilary Term 2012

Course 2E02 2012 (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) $\mathbf{v}_1 = (1, -2, 1)$, $\mathbf{v}_2 = (2, -1, 0)$, $\mathbf{v}_3 = (2, 0, 0)$;

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

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

Exercise 2

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

$$\mathbf{u} = (1, -2, 4);$$

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

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

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

Exercise 3

Which of the following sets of vectors are linearly dependent?

(i) $(0, 3)$, $(0, -2)$;

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

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