October 31, 2017 Lecturer Dmitri Zaitsev

Course 2E01 2017 (SF Engineers & MSISS & MEMS)

S h e e t 5

Due: at the end of the tutorial

Exercise 1

Find the coordinates of the vector $\mathbf{v}$ with respect to the basis $\mathbf{v}_1, \ldots, \mathbf{v}_n$ (i.e. the coefficients $k_1, \ldots, k_n$ in the representation $\mathbf{v} = k_1\mathbf{v}_1 + \cdots + k_n\mathbf{v}_n$):

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

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

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

Exercise 2

Write the general solution of the system as a sum of its partial solution and a linear combination of basis vectors of the associated homogenous system:

(i)

$$\begin{cases} x + y + t = 1 \\ -z + 2t = -3 \end{cases};$$

(ii)

$$\begin{cases} x_4 - x_3 = 1 \\ x_3 - x_2 = 1 \\ x_2 - x_1 = 1 \end{cases};$$

(iii)

$$x_1 - x_2 + x_3 - x_4 = 5.$$