September 22, 2019 Lecturer Dmitri Zaitsev

MAU22E01 2019 (SF Engineers & MSISS & MEMS)

S h e e t 2

Due: at the end of the tutorial

Exercise 1

Write the system in the matrix form:

(i)

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

(ii)

$$\begin{cases} 2x + 12z = -1 \\ t + 2y = -1 \\ 3y + z + x = -2 \end{cases}$$

Exercise 2

Find the matrix for the linear transformations T defined by the equations

(i) $w_1 = t_1, \quad w_2 = t_2 + t_1,$

(ii) $w_1 = x - 2y, \quad w_2 = z - y, \quad w_3 = -2x,$

and by the formula

(iii) $T(x_1, x_2, x_3) = (x_3 + x_1, -2x_2, x_1 + 2x_2 + x_3, -2x_1, x_3, x_1).$

Exercise 3

Find $T(\mathbf{x}) = A\mathbf{x}$ for the matrix A and the vector $\mathbf{x}$ whenever the product makes sense (i.e. the sizes of A and $\mathbf{x}$ fit together):

(i) $A = \begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 5 \end{pmatrix}, \mathbf{x} = \begin{pmatrix} 10 \\ -2 \\ 1 \end{pmatrix},$

(ii) $A = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \mathbf{x} = \begin{pmatrix} 0 \\ -1 \\ -2 \end{pmatrix},$

(iii) $A = \begin{pmatrix} 1 & 2 \\ -1 & 1 \\ 0 & -1 \end{pmatrix}, \mathbf{x} = \begin{pmatrix} 1 \\ -1 \end{pmatrix}.$