Course 2E1 2006-07 (SF Engineers & MSISS & MEMS)

S h e e t 14

Due: at the end of the tutorial

Exercise 1

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

(ii) $A = \begin{pmatrix} 0 & 1 & 0 \\ 3 & 2 & 1 \end{pmatrix}$, $\mathbf{x} = \begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix}$,

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

Exercise 2

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

(i) $w_1 = x_1 + x_2, \quad w_2 = x_2,$

(ii) $w_1 = 2x + z, \quad w_2 = -y, \quad w_3 = 3z,$

(iii) $w_1 = x_4 - x_3, \quad w_2 = x_4 + x_3, \quad w_3 = x_4 - x_3 + x_2, \quad w_4 = x_4 + x_3 + x_2 - x_1,$

and by the formulas

(v) $T(x_1, x_2) = (-x_1, -x_2)$,

(iv) $T(x_1, x_2, x_3) = (x_2, -x_1, x_2 - x_1, 5x_1, -4x_3)$.