October 20, 2007 Lecturer Dmitri Zaitsev Michalemas Term 2008

Course 2E2 2008-09 (SF Engineers & MSISS & MEMS)

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Due: at the end of the tutorial

Exercise 1

Find $\mathbf{v}+\mathbf{u}$, $-3\mathbf{v}$, $\|\mathbf{u}\|$, $\|\mathbf{v}\|$, the dot product $\mathbf{u}\cdot\mathbf{v}$, the angle between $\mathbf{u}$ and $\mathbf{v}$ and determine whether $\mathbf{u}$ and $\mathbf{v}$ are orthogonal (or for which values of parameters $\mathbf{u}$ and $\mathbf{v}$ are orthogonal, if any are present):

(i) $\mathbf{u}=(1,2,0)$, $\mathbf{v}=(-2,1,0)$;

(ii) $\mathbf{u}=(1,0,0,1,0)$, $\mathbf{v}=(1,1,-2,1,0)$;

(iii) $\mathbf{u}=(1,k,2,-k)$, $\mathbf{v}=(0,k,1,7)$;

(iv) $\mathbf{u}=(a,c,0,b,0)$, $\mathbf{v}=(-2c,a,-c,0,d)$.

Exercise 2

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

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

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

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

and by the formulas

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

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