

**Course 2E2 2008-09 (SF Engineers & MSISS & MEMS)****S h e e t 7**

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Due: at the end of the tutorial

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**Exercise 1**

Find the rank and the nullity of the matrix:

(i)  $(-2 \ 1 \ 0)$ ;

(ii)  $\begin{pmatrix} -2 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & -2 & -1 \end{pmatrix}$ .

**Exercise 2**

Calculate the length of  $\mathbf{u} = (1, 1, -1)$ , the distance between  $\mathbf{u}$  and  $\mathbf{v} = (1, 0, 1)$  and the angle between  $\mathbf{u}$  and  $\mathbf{v}$

(i) with respect to the standard dot product;

(ii) with respect to the inner product given by  $\langle \mathbf{u}, \mathbf{v} \rangle = u_1 v_1 + 3u_2 v_2 + u_3 v_3$ .