

Course 2E1 2005-06 (SF Engineers & MSISS & MEMS)

S h e e t 18

Due: in the tutorial sessions next Wednesday/Thursday

Exercise 1

Calculate the length of $\mathbf{u} = (1, -1, 1)$, the distance between \mathbf{u} and $\mathbf{v} = (0, 1, 1)$ 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 $\langle \mathbf{u}, \mathbf{v} \rangle = u_1 v_1 + 2u_2 v_2 + 3u_3 v_3$.

Exercise 2

Which of the following bases are orthogonal and which are orthonormal?

- (i) $(-1, 0), (0, -4)$;
- (ii) $(0, 0, 1), (1, 1, 0), (-1, 1, 0)$;
- (iii) $(1, 0, 0), (0, \frac{3}{5}, -\frac{4}{5}), (0, \frac{4}{5}, \frac{3}{5})$;

Exercise 3

Calculate the coordinates of \mathbf{v} relative to the basis in Exercise 2 (iii):

- (i) $\mathbf{v} = (1, 1, 1)$;
- (ii) $\mathbf{v} = (-1, 1, -1)$.