

Course 2E02 2010 (SF Engineers & MSISS & MEMS)**S h e e t 6**

Due: at the end of the tutorial

Exercise 1

Calculate the length of $\mathbf{u} = (-1, 0, -1)$, the distance between \mathbf{u} and $\mathbf{v} = (1, 1, 0)$ 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 $\langle \mathbf{u}, \mathbf{v} \rangle = u_1v_1 + u_2v_2 + 2u_3v_3$.

Exercise 2

Which of the following bases are orthogonal and which are orthonormal (with respect to the standard dot product)?

- (i) $(-1, 0), (0, 2)$;
- (ii) $(0, 0, 2), (-1, -1, 0), (1, -1, 0)$;
- (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 orthogonal basis

$$\{(1, 0, 0), (0, 3, -4), (0, 4, 3)\} :$$

- (i) $\mathbf{v} = (2, -1, 1)$;
- (ii) $\mathbf{v} = (1, 1, -1)$.