Exercise 1
Calculate the length of $u = (-1, 1, 0)$, the distance between $u$ and $v = (0, -1, 0)$ and the angle between $u$ and $v$
(i) with respect to the standard dot product;
(ii) with respect to the inner product given by $\langle u, v \rangle = u_1v_1 + 3u_2v_2 + 2u_3v_3$.

Exercise 2
Which of the following bases are orthogonal and which are orthonormal with respect to the standard dot product?
(i) $(2, 0), (0, -1)$;
(ii) $(0, 0, 1), (2, 2, 0), (-1, 1, 0)$;
(iii) $(-1, 0, 0), (0, -\frac{2}{\sqrt{5}}, \frac{4}{\sqrt{5}}), (0, \frac{4}{\sqrt{5}}, \frac{3}{\sqrt{5}})$.

Exercise 3
Calculate the coordinates of $v = (1, 2, -3)$ relative to the orthogonal basis
$\{(3, 0, 0), (0, 2, 4), (0, 4, -2)\}$:
(i) with respect to the standard dot product;
(ii) with respect to the inner product $\langle u, v \rangle = u_1v_1 + 4u_2v_2 + u_3v_3$ (check that the given basis is still orthogonal with respect to this inner product).