Exercise 1

Use matrix multiplication to find:

(i) the reflection of the vector \((1, 6)\) about the \(y\)-axis;
(ii) the orthogonal projection of the vector \((-1, 4)\) to the \(x\)-axis;
(iii) the image of the vector \((-3, -1)\) under rotation through the angle \(\frac{\pi}{3}\) about the origin.
(iv) the image of the vector \((2, 1)\) under rotation through the angle \(-\frac{\pi}{4}\) about the origin.

Exercise 2

Determine which of the following are subspaces of \(\mathbb{R}^3\):

(i) the set of all vectors of the form \((a, 0, a)\);
(ii) the set of all vectors of the form \((a, 5, a)\);
(iii) the set of all vectors of the form \((a, b, 2a - b)\);