Exercise 1

(i) Find parametric equations for the line spanned by the vector:

\[ \mathbf{u} = (1, 2, -5); \]

(ii) Give two equations that determine the line in (i).

(iii) Find an equation for the plane spanned by the vectors:

\[ \mathbf{u} = (1, 1, -1), \quad \mathbf{v} = (-1, 0, 1). \]

Exercise 2

Which of the following sets of vectors are linearly dependent?

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

(ii) \((0, -1, 1), (1, -1, 0), (1, 1, 1)\);

(iii) \((0, 0, 1, 0, 0), (1, 1, -1, 1, 1), (1, 1, 0, 1, 1)\).

Exercise 3

Which of the following sets of vectors are bases for the corresponding space \(\mathbb{R}^n\)? (The dimension \(n\) should be clear from the length of vectors.)

(i) \((-1, -1)\);

(ii) \((0, 1), (1, 1)\);

(iii) \((-2, 2), (3, -3)\);

(iv) \((1, 1), (5, -2), (-1, 1)\);

(v) \((1, 1, 1, 0), (0, 1, 3, 3), (1, 3, 2, 1)\);

(vi) \((2, 0, 1), (0, 2, 0), (2, 1, 1)\).