Exercise 1

Determine whether the vectors span $\mathbb{R}^3$:

(i) $v_1 = (1, -1, 0), \ v_2 = (2, -1, 0), \ v_3 = (1, 0, 0)$;

(ii) $v_1 = (1, -1, 0), \ v_2 = (2, -1, 0), \ v_3 = (1, 0, 0), \ v_4 = (1, 0, 1)$.

Determine whether the vectors span $\mathbb{R}^4$:

(iii) $v_1 = (1, 1, 0, -1), \ v_2 = (1, 2, 0, 0), \ v_3 = (1, 0, 0, 0), \ v_4 = (1, 0, 1, 0)$.

Exercise 2

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

$$u = (2, -1, 1);$$

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

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

$$u = (1, 1, -1), \ v = (-2, 0, 1).$$