Spanning:-

If $S = \{v_1, v_2, \ldots v_n\}$ is a set of Vectors in a vector space V, then the subspace W of V consisting of all linear Combinations of the vectors in S is called the space spanned by $v_1, v_2, v_3, \ldots v_n$ and we say that the vectors $v_1, v_2, v_3, \ldots v_n$ span W. To indicate that w is the space spanned by the vectors in the set

$$S = \{v_1, v_2, v_3, \ldots v_n\}$$

we write

$$W = span(S) \quad \text{or} \quad W = span\{v_1, v_2, \ldots v_n\}$$

Determine weather $v_1 = (1, 1, 2)$, $v_2 = (1, 0, 1)$ and $v_3 (2, 1, 3)$ span the vector space R^3.   ②

Solution

We must determine weather an arbitrary vector $b = (b_1, b_2, b_3)$ in R^3 can be expressed as a linear combination

$$b = k_1 v_1 + k_2 v_2 + k_3 v_3$$

$$(b_1, b_2, b_3) = k_1(1, 1, 2) + k_2(1, 0, 1) + k_3(2, 1, 3)$$