

(1) Determine if the following vectors form a basis for R^3 : $\{(3, 1, -4), (2, 5, 6), (1, 4, 8)\}$.

[4]

(2) Let $\mathbf{v} = (2, -1, 3)$ and $S = \{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ where $\mathbf{v}_1 = (1, 0, 0)$, $\mathbf{v}_2 = (2, 2, 0)$ and $\mathbf{v}_3 = (3, 3, 3)$. Determine $(\mathbf{v})_S$, the coordinates of \mathbf{v} relative to the basis S .

[5]

(3) Find a basis for the following subspaces of \mathbb{R}^3 :

(i) The plane $3x - 2y + 5z = 0$

[3]

(ii) The line $x = 2t, y = -t, z = 4t$

[3]