

i) (12 Points) State which of the following subsets are subspaces. Explain.

a) $V = R_3$ and W is the subset of all vectors $[a \ b \ c]$ in R_3 with $a + b + c = 0$.

b) $V = M_{nn}$ and W is the set of all matrices in V that are non-singular.

ii) (8 Points) Let $S = \{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ with $\mathbf{v}_1 = \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}$, $\mathbf{v}_2 = \begin{bmatrix} 0 \\ 3 \\ 1 \end{bmatrix}$ and $\mathbf{v}_3 = \begin{bmatrix} 5 \\ 1 \\ 12 \end{bmatrix}$. Determine whether the set S spans the vector space R^3 .