Cypress College Math Review: Subspaces

Let U be a subset of a vector space V. U is a subspace of V if and only if

1. U is nonempty
2. U is closed under addition
3. U is closed under multiplication by a scalar

Prove the given set does or does not constitute a subspace of the given vector space.

Example) Let V = the space of all functions defined on an interval I. U = the set of all functions in V that satisfy the equation: $f''(x)+2f(x)=0$ for all x in I.

Prove the given set does or does not constitute a subspace of the given vector space.

Example) $U = \left\{ \begin{bmatrix} a & b \\ c & 7 \end{bmatrix} : a,b,c \in \mathbb{R} \right\} \subseteq M_{2\text{x}2}$ (2x2 real matrices)

Prove the given set does or does not constitute a subspace of the given vector space.

Example) $U = \left\{ \langle a, b, a + 2b \rangle : a, b \in \mathbb{R} \right\} \subseteq \mathbb{R}^3$