1. True or False?

Let $V = \mathbf{F}^{3,3}$ be the vector space of 3×3 matrices. Let U be the subset of V consisting of upper triangular matrices. Then U is a subspace of V.

2. True or False?

Let $V = \mathbf{F}^{3,3}$ be the vector space of 3×3 matrices. Let U be the subset of V consisting of symmetric matrices. Then U is a subspace of V.

3. True or False?

If U is a sub*set* of a vector space V containing 0 and such that $\lambda u + u' \in U$ whenever $u, u' \in U$ and $\lambda \in \mathbf{F}$, then U is a subspace of V.

4. Let

$$U = \{(a, b, c) \in \mathbf{R}^3 : a^3 = b^3\}$$

and

$$V = \{(a, b, c) \in \mathbf{C}^3 : a^3 = b^3\}.$$

(A) U is a subspace of $\mathbf{R}^3$, and V is a subspace of $\mathbf{C}^3$.

(B) U is a subspace of $\mathbf{R}^3$, but V is *not* a subspace of $\mathbf{C}^3$.

(C) U is *not* a subspace of $\mathbf{R}^3$, but V *is* a subspace of $\mathbf{C}^3$.

(D) U is *not* a subspace of $\mathbf{R}^3$ and V is *not* a subspace of $\mathbf{C}^3$.

5. True or False?

If U_1, U_2 and W are subspaces of V such that $U_1 + W = U_2 + W$, then $U_1 = U_2$.

6. True or False?

If U_1, U_2 and W are subspaces of V such that $V = U_1 \oplus W$ and $V = U_2 \oplus W$, then $U_1 = U_2$.

7. Let V be a vector space. The operation of addition on the set of all subspaces of V has...

(A) No additive identity.

(B) An additive identity, but no subspace has an additive inverse.

(C) An additive identity, but not all subspaces necessarily have additive inverses.

(D) An additive identity, and all subspaces have additive inverses.