

Name: KEY

Circle "True" or "False" for each of the following problems. Circle "True" only if the statement is always true. No explanations necessary.

1) Let X and Y be sets of vectors in a vector space V with $X \subseteq Y$.

a) True False If X is linearly dependent, then Y is linearly dependent.

b) True False If X is linearly independent, then Y is linearly independent.

2) Let X be a collection of vectors in a vector space V .

a) True False If the zero-vector is in X , then X is linearly dependent.

b) True False If X has only one vector, then X is linearly independent if and only if this vector is not the zero-vector.

Fill in the blanks!

3) **Independence Extension Lemma.** Let V be a vector space and let S be a linearly independent collection of vectors from V . Assume that S does not span V and let $u \in V$ but u

$\notin \text{Span}(S)$. Then $S \cup \{u\}$ is a linearly independent set.

4) **Span Preservation Lemma.** Let V be a vector space and let S be a spanning set of V . Assume that there is $u \in S$ that is a linear combination of other vectors in S .

Then $S - \{u\}$ spans V .