Smith **Math 290** **Fall 2009**

Proof VS-1

Accepted **Not Accepted**

I affirm this work abides by the university's Academic Honesty Policy.

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Print Name, then Sign

- First due date **Thursday, November** 6.
- Turn in your work on a separate sheet of paper with this page stapled in front.
- Do not include scratch work in your submission.
- There is to be **no collaboration** on any aspect of developing and presenting your proof. Your only resources are: you, the course textbook, me, and pertinent discussions that occur **during class.**
- Follow the Writing Guidelines of the Grading Rubric.
  (http://math.ups.edu/~bryans/Current/Fall_2008/290inf_Fall2008.html#tth_sEc5.1)
- Retry: Only use material from the relevant section or earlier.
- Retry: Start over using a new sheet of paper.
- Retry: Restaple with new attempts first and this page on top.

"*By relieving the brain of all unnecessary work, a good notation sets it free to concentrate on more advanced problems, and, in effect, increases the mental power of the race.*" – Alfred North Whitehead

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VS-1 (Section S)

1. Use the Principle of Mathematical Induction to prove the following theorem.

   Theorem 1 *If $W_1, W_2, \cdots, W_n$ are subspaces of a vector space V, then their intersection $\bigcap_{k=1}^{n} W_k$ is also a subspace of V.*

2. Show that no analogous theorem can be true for unions by specifying two particular subspaces of $\mathbf{C}^3$ whose union is not a subspace of $\mathbf{C}^3$. Be sure to explain why the union is not a subspace.

Notes:

- The intersection of sets S and T is defined by $S \cap T = \{x : x \in S \text{ and } x \in T\}$.
- This extends naturally to the intersection of a finite collections of sets $S_1, S_2, \cdots, S_n$ with the definition

$$\bigcap_{k=1}^{n} S_k = \{x : x \in S_k,\ 1 \leq k \leq n\}.$$

- The union of sets S and T is defined by $S \cup T = \{x : x \in S \text{ or } x \in T \text{ (or both)}\}$
- The easiest subspaces to look at are those that are the spans of sets of vectors.
