# Introduction to Linear Algebra, Spring 2007
# MATH 3130, Section 001

## PROJECT 2

| |
|---|
| **NAME 1:** |
| **NAME 2:** |
| **NAME 3:** |

**Instructions:** In groups of 2 to 3 people (preferably 3), answer any 3 of the following questions. If you complete more than 3 questions, I will grade the first 3. Each group is required to turn in one set of solutions. Your answers should be written up on separate paper and *neatly presented* (do not write your answers on this sheet). In order to receive full credit on each question, you must justify your answers and show all of your work. When you are using a theorem (or fact in a Blue Box) to make a conclusion, be sure to state which theorem you are using and where you are using it. Use this document as the cover page to your project. The names of the people in your group should appear above. Also, circle the problems below that you have completed. Each problem is worth 10 points. This project is due Friday, March 23. Please come talk to me if you have questions. Enjoy!

1. Prove Theorem 2.3(d).
2. Let $V$ be a vector space (over $\mathbb{R}$). Let $H$ and $K$ be subspaces of $V$. The intersection of $H$ and $K$, written as $H \cap K$, is the set of all $\mathbf{v} \in V$ that belong to both $H$ and $K$. Prove that $H \cap K$ is a subspace of $V$.
3. Let $V = \mathbb{R}^2$ with the usual scalar multiplication, but instead of the usual definition of addition, define

$$(x_1, y_1) + (x_2, y_2) = (x_1 + x_2 + 1, y_1 + y_2 + 1).$$

   Determine whether $V$ is a vector space. If $V$ is a vector space, then prove it. If $V$ is not a vector space, then show that one of the axioms of vector spaces fails.
4. Read Section 1.10 and complete Exercise 10 on page 101.
5. Read Section 2.7 and complete Exercise 18 on page 166.