Math 421: Exam 1
Due: October 13, 2008

This is a closed book exam meaning no books, no notes, no calculators.
I understand and will uphold the ideals of academic
honesty as stated in the Honor Code.

_____
Please Sign Name

_____
Please Print Name

Start Time: _____
End Time: _____
Time Used: __/240 min

Problem	Points	Score
1	15	
2	15	
3	20	
4	15	
5	20	
6	15	
Total	100	

1. (15 points) Let $\{A_j : j \in J\}$ be an indexed family of sets and let B be a set. Prove

$$B \cap \left[\bigcup_{j \in J} A_j\right] = \bigcup_{j \in J} (B \cap A_j)$$

2. (15 points) Suppose $f : A \to B$ and $g : B \to C$ are both injective functions. Prove

$$g \circ f : A \to C$$

in injective.

3. (20 points) Let S and T be nonempty bounded subsets of $\mathbb{R}$ with $S \subseteq T$. Prove

$$\inf T \leq \inf S \leq \sup S \leq \sup T.$$

4. (15 points) If x is an isolated point of a set S, then $x \in \text{bd } S$.

5. (20 points) If A is open and B is closed, prove $A \backslash B$ is open and $B \backslash A$ is closed.

6. (15 points) Prove that a finite union of compact sets in $\mathbb{R}$ is compact. Is this true for an infinite union? Justify your answer.

Mid-semester Course Evaluation

Please tear off and submit separately

1. How is the pace of the course?

2. How is the teaching style of the course?

3. How is the presentation of the course material?

4. Is the course stimulating your intellectual curiosity?

5. Explain aspects of the course that you like.

6. Explain aspects of the course that you would like changed.

7. Questions/Comments/Vent