

# MA 426-003/591M-003 Homework

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Assigned September 13, 2002, Due September 20, 2002

1. Do p. 155, problem 2, by finding an open cover that has no finite subcover.
2. P. 155, problem 4. Ignore parts a and b. Instead, show that  $A$  is compact by showing that every open cover of  $A$  has a finite subcover.
3. Let  $A$  be a compact subset of  $\mathbb{R}^n$ . Let  $B$  be a closed subset of  $A$ . Without using any theorems, show that  $B$  is compact. Hint: Let the  $U_i$ 's be an open cover of  $B$ . Then the  $U_i$ 's together with the set  $\mathbb{R}^n \setminus B$  are an open cover of  $A$ .
4. Let  $A$  be a subset of  $\mathbb{R}^n$ . Prove: If  $\text{diameter}(A)$  is finite, then  $A$  is bounded.
5. P. 174, problem 20. This is an alternate proof of part of the Heine-Borel Theorem.
6. P. 175, problem 25. Hint: Bolzano-Weierstrass Theorem.