Remember that your work will be graded both on the quality of writing and its mathematical correctness. The writing quiz on 1 November 2012 will be based on a subset of the problems below.

IMPORTANT: Recall that we changed the definitions of open and closed sets from what appears in your textbook. Namely:

- A set $S \subset \mathbb{R}$ is *open* iff every point in S is an interior point of S.
- A set $S \subset \mathbb{R}$ is *closed* iff $S^C = \mathbb{R} \setminus S$ is open.

In the end it all works out the same, but it means, for example, that the book's definition of *closed set*– contains its boundary points–is a theorem about closed sets for us, not a definition.

(1) Prove Theorem 13.10 (page 132) using the definitions given in class (and above).

(2) Prove Corollary 13.11 (page 132) using the definitions given in class (and above).

(3) Give a counterexample to show why "finite" is necessary in Theorem 13.10(b) and Corollary 13.11(b). For 13.10(b), for example, you should give an infinite collection of open sets whose intersection is NOT open, and prove that your claim about the intersection is correct.

(4) Exercise 13.5(a,b,e); Prove your answer to each.