CSE191, Fall 2013 **Assignment 8** **Due Fri. 11/15**

Reading: Please do read Sections 5.3–5.4 over the weekend, as I will be drawing examples from there even as I cover 5.1–5.2. But you may skip Section 5.5. **Prelim II**, which is definite for **Friday, Nov. 22** *in class period*, will cover up through section 5.4, minus Chapter 3 and other skim/skipped sections previously noted. It is "cumulative" insofar as logic is needed for some proofs involving sets and numbers etc., but will focus on the domain of assignments 5–8. This assignment, and hence Prelim II, covers induction only on the natural numbers, not on other recursively defined structures per section 5.3. The two lectures before the prelim will be from Chapter 6 up through section 6.4; then the course will jump over chapters 7–9 (except possibly for a flyby of the "Master Theorem" on page 532), and will finish with selected parts of chapters 10 and 11.

(1) Rosen, page 329 in section 5.1, exercise 4, all parts. You must word them in "$n-1$ to n" style. (12 pts. total, with 2 for (b) and 6 for (e))

(2) Rosen, page 330 in section 5.1, exercise 14. Itemize the steps as the text asks in problem (4). (12 pts.)

(3) Rosen, page 330 in section 5.1, exercise 18. Notice that the text wants you to itemize the steps again. But instead, follow the "proof script" given in lecture which is a little less picky. (18 pts.)

(4)Rosen, page 330 in section 5.1, exercise 32. Use 0 rather than 1 as the base case. Is there a quick way you can tell if it holds for negative n, without doing another induction? (18 pts. total)

(5) Rosen, page 331 in section 5.1, exercise 42. Is it enough to take $n = 1$ as the basis, or do you need to prove it "by hand" for $n = 2$ to make the induction step go through? (See Exercise 49 below it for a hint.) Note that since the sets A_i are universally quantified and arbitrary, you may apply the theorem recursively with any combination of them playing the role of "A_1," not just sticking to $A_1, \dots, A_n$ as given.

Then prove it without induction but using logic as in (the answer key for) problem (4) of Assignment 7, which uses predicates and quantifiers to analyze big unions and intersections. (12 + 9 = 21 pts.)

(6) Rosen, page 342, exercise 4 on page 342. (This may not be covered in lecture until next Wednesday, but it's not hard. 9 pts., for 90 total on the set.)