Please review carefully the instructions given for Homework 1. They apply to this assignment, too.

Please hand in your answers to the following problems. Problem numbers, where indicated, are from the seventh edition of the Rosen text.

Note: In what follows, “Mathematical Induction” refers to the technique discussed in Sec. 5.1, while “Strong Induction” refers to the technique discussed in Sec. 5.2. In either case, be sure to state what $P(n)$ is and show your work clearly, i.e., basis step, inductive step (including induction hypothesis), and final conclusion based on the “Principle of Mathematical/Strong Induction”.

1. (4 points) Use Mathematical Induction to prove that $(A_1 \cap \overline{B}) \cup \cdots \cup (A_n \cap \overline{B}) = (A_1 \cup \cdots \cup A_n) \cap \overline{B}$, for $n \geq 2$. (Use a known set identity for the base case.)


3. (6 points) p. 332, #68. Let $n \geq 2$ and show that the number of questions needed is at most $3n - 4$. (Note that this bound is slightly better than the one stated in the text.) Use Mathematical Induction.


5. (5 points) p. 342, #14. Let $n \geq 1$. Use Strong Induction.


7. (5 points) Use the Well-Ordering Property to prove that $\sum_{i=0}^{n} r^i = (r^{n+1} - 1)/(r - 1)$, for all $n \geq 0$, where $r \neq 1$ is a real number. Use of any other method, including Mathematical or Strong Induction, will earn no credit.