Problem Set 7.5

Due: Never.

Read section 4.3 in Rosen.

This is a "fake" problem set intended for midterm preparation only. Do not turn in solutions.

Problem 1. A liscence plate has three digits followed by three letters. However, there are 11 three-letter sequences that the state deems offensive and never uses. These sequences are... never mind. How many inoffensive liscence plates are there?

Problem 2. How many binary strings $b_1 b_2 \ldots b_{2n}$ are there such that for all $1 \leq k \leq n$, one of b_{2k-1} and b_{2k} is a zero and the other is a one?

Problem 3. Use inclusion-exclusion to prove that at most a quarter of the numbers less than one million are prime.

Problem 4. Suppose that two teams play a series of games against each other until one team is ahead by two games or one team wins a total of four games. How many series are possible?

Problem 5. Determine the cardinality of each of the following sets.

(a) The set of bijective functions from the set of n-bit strings to itself.

(b) The set of $n \times n$ matrices such that each of the numbers 1 to $2n$ appears at most once in each column.