Math 313, Review Questions,To be discussed in class Wed., Feb. 25, 2004

The first test will be on Friday, Feb. 27, in class, and will cover the material we talked about in the first three chapters, which is roughly the first three assignments, without the combinatorial identities. Ordinarily, I'd give some more old exam questions, but I pretty much used them up on Homework 3. So here are some suggested review questions, mostly from the book, with answers in the back. I will be happy to talk about them in class on Wed. Feb. 25. So that we don't fall too far behind, I will hand out Homework 4 on Monday, but it won't be due until Friday March 5.

So remember, there is **nothing** to hand in for these review questions, and I will not be writing up solutions, either. These are a springboard for discussion.

Chapter 1 (§1.8): Not really much to hang onto here, perhaps problem 27. The purpose of this chapter was to give a sense of combinatorial thinking, which is awfully hard to test.

Chapter 2 (§2.4) #7. (This is easiest to think about as a question in arithmetic, mod 100. The same principle applies with 100 replaced by $2n$ and 52 replaced by $n+2$.); #14, #27 and this one, which is essentially #20:
Suppose the graph K_{17} is given; that is, 17 vertices and any two of them are connected with an edge. Suppose that each edge is colored red or white or blue. Prove that among the $\binom{17}{3}$ triangles formed, there is at least one which is all red or one which is all white or one which is all blue. The hint in the book is this: pick any vertex and look at the 16 edges emanating from it. By the pigeonhole principle, at least k of them should have one particular color, say red. (I won't tell you what k is, but you should figure it out.) You then look at these k vertices and the edges between them. Either at least one of them is red, or none of them is red. Proceed accordingly.

Chapter 3 (§3.6) #6 (lots of cases, unfortunately), #10 (you should know a better way to do it than the answer in the back), #12 (in b., there's a sensible order to the dorms), #25 (there is a shortcut), #32, plus the inevitable card problem:

What is the probability that in a poker hand, you will have cards from exactly three different suits?