Math 453 Combinatorics, Pelsmajer, May 6, 2008
Comments on graded HW since the midterm exam

Midterm Exam regrade

I was very surprised that many people didn't really attempt to redo the exams perfectly, since it's a big part of the grade, and I offered to help people individually as needed, to ensure this. (Ignoring the issue of grades and such, just thinking about a love of knowledge and/or mathematics, I also can't understand it — if it was important enough to go on a 75-minute exam, how can you endure not knowing how to do all the problems??) Anyway, I told you that everyone could get an A or a B assuming that the exams were redone perfectly (or close to perfectly) — but if you didn't, then the guarantee doesn't apply... and that's why there are C's.

Maybe I'm missing something, since I just can't understand what happened. If someone can explain, please seek me out and do so.

Polya-Burnside-Frobenius (counting w/symmetry)

Almost everything is fair game for the exam, and counting w/symmetry will be heavily featured on the final exam. The only exceptions that comes to mind are problems (A1)(A2)(A3)(A4).

Design Theory

Note that many of these theorems & constructions are not "if and only if"; they only work in one direction.

E.g., "If n is the power of a prime, then there is a complete MOLS(n)". But what if n is not the power of a prime? The theorem doesn't apply, so *maybe* there is a complete MOLS(n) and maybe there isn't a complete MOLS(n). We can't draw any conclusions from the theorem... except this: If we really want to know the answer, we're going to have to go about it some other way, since the theorem won't help us.

Maybe a different theorem will help, maybe not. Maybe there's some other way to figure it out... but maybe *not*! Bear in mind that many problems in design theory (and elsewhere) are currently unsolved... in which case clearly there can't exist a nice theorem that tells you the answer in all situations!

Another example of a theorem which is not IFF: "If bv does not equal kr, then there doesn't exist a (b, v, r, k, λ)-design." But what if $bv = kr$? Then the theorem doesn't apply, so we still don't know the answer, and all we've learned is this: If we really want to know the answer, we're going to have to try something other than using that theorem!

9.4#45 was not phrased optimally, and few people got it. But it's worth doing. *Try this, if you didn't get #45:*

(Z) Let $(X, \mathcal{B})$ be a $t-(b, v, k, r, \lambda)$-design, and let J be a subset of X of size j. Let λ_j be the number of blocks containing J. Find λ_j.

Hint: Count the number of pairs (T,S), where T is a t-set containing J, and S is a block containing T. Count them in two different ways.

Final Exam Tuesday 8am-10am. I can make time for a study/review session if you like, anytime Sunday or Monday. But y'all have to organize it.