Basic Combinatorics

Math 40210, Section 01 — Fall 2012

Homework 2 — due Friday September 7

General information: Homework is an essential part of your learning in this course, so please take it very seriously. It is extremely important that you keep up with the homework, as if you do not, you may quickly fall behind in class and find yourself at a great disadvantage during exams.

You should treat the homework as a learning opportunity, rather than something you need to get out of the way. Reread, revise, and polish your solutions until they are correct, concise, efficient, and elegant. This will really deepen your understanding of the material. I encourage you to talk with your colleagues about homework problems, but your final write-up must be your own work.

You should present your final homework solutions clearly and neatly. Keep in mind that when you write a homework solution, you are trying to communicate the solution to someone other than yourself, so incomplete sentences and personal shorthand is not helpful!

Due to manpower issues, I will only grade selected homework problems, but I plan to quickly post solutions to all the problems soon after I've collected them up.

Reading:

- Introduction to Section 1.2
- Section 1.2.1 (the proof of Theorem 1.6 is optional)
- Section 1.2.2, up to the end of the proof of Theorem 1.7
- Section 1.2.3 (just for fun)
- Section 1.3.1
- Section 1.3.2 (the proofs of Theorems 1.15 and 1.16 are optional)

Problems:

- Section 1.2.1: 8(d), 11(a) (holdovers from homework 1)
- Section 1.2.2: 1(b,c,d), 2, 4, 5 (for concreteness, in 1b just take $k = 3$, and in 1c take $m = 4, n = 3$)
- Section 1.3.1: 3, 4
- Section 1.3.2: 1(a,d,e), 2, 5, 9, 12

Here is a problem that **is** part of this assignment, but is not from the textbook:

- Extra problem: 1.3.2(2) asks to show that every tree with an even number of edges has a vertex of even degree. Justify or give a counter example to each of these three related statements:

    1. Every tree with an even number of edges has a vertex of odd degree.
    2. Every tree with an odd number of edges has a vertex of even degree.
    3. Every tree with an odd number of edges has a vertex of odd degree.