Basic Combinatorics

Math 40210, Section 01 — Spring 2012

Homework 2 — due Friday, February 3

**General information:** 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, up to the end of the proof of Theorem 1.4
- Section 1.2.2, up to the end of the proof of Theorem 1.7
- (Section 1.2.3 - purely for your own personal amusement, no graded work on this)
- Section 1.3.1
- Section 1.3.2, up to the end of the proof of Theorem 1.14

**Problems:**
- Section 1.2.1: 2, 7, 8(d), 11(a)
- Section 1.2.2: 1(b,c) (if you wish, for concreteness just take \( k = 3 \) in (b) and \( m = 4, n = 3 \) in (c)), 2, 4
- Section 1.3.2: 1(a,d,e), 2, 5, 9, 12

- **Bonus problem (easy):** 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.