Basic Combinatorics

Math 40210, Section 01 — Fall 2012

Homework 8 — due Friday, November 16

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:

- Section 1.8.1
- Section 1.8.2
- Section 2.4 (just read about approximating irrationals by rationals for your own amusement)
- Section 2.5
- Section 2.6.4

Problems:

- Section 1.8.1: 1, 3, 5
- Section 1.8.2: 5
- Section 2.4: 3, 4, 5, 7, 10, 13
- Section 2.5: 1, 6, 7, 8, 10, 12 (for 10a, the yield sign can also be thought of as a triangle with an extra edge attached to one vertex; for 12, here's a **warning**: I think that there is a typo in the text; T_{10} should be 145510740)
- In class we showed that the chromatic polynomial of C_3 is $P_{C_3}(q) = q(q-1)(q-2) = (q-1)^3 + (-1)^3(q-1)$, and that that chromatic polynomial of C_4 is $P_{C_4}(q) = q^4 - 4q^3 + 6q^2 - 3q = (q-1)^4 + (-1)^4(q-1)$. Prove that this pattern continues: that for all $n \geq 3$,

$$P_{C_n}(q) = (q-1)^n + (-1)^n(q-1).$$