

Homework 3: Random and Quasirandom Graphs

Week 4

Mathcamp 2012

Attempt all of the problems that seem interesting, and let me know if you see any typos!
(-) problems are maybe tedious to attempt. (+) problems are harder than the others.
(++) problems are currently open.

1. Show that the two different formulations of P_0 we gave in the notes are equivalent.
2. For each of the properties $P_1(s), P_2(t), P_3, P_4, P_5$, create a family of graphs (i.e. some infinite sequence of graphs with vertex size going off to infinity, so that you can actually talk about what these asymptotic things mean) that do not satisfy that property, but do satisfy P_0 .
3. Show that $P_1(3) \Rightarrow P_0$, for any $s \geq 3$. Does your proof work if we try to start from $P_1(2)$ instead?
4. In class, we claimed that $P_2(2k) \Rightarrow P_3$, even though we only proved it for $P_2(4) \Rightarrow P_3$. Read through the proof of this claim that we did on Wednesday, and change it so that it works if we know the number of $2k$ -cycles, instead of just the number of 4-cycles.
5. Similarly, show that $P_2(t) \Rightarrow P_0$, for any $t \geq 3$.