Homework of Week 10

Deadline: 9:00am, January 14 (Thursday), 2021

1. Consider a graph in $G_{n,p}$ with $p = c\frac{\ln n}{n}$. Use the second moment method to prove that if $c < 1$ then, for any constant $\epsilon > 0$ and for sufficiently large n, the graph has isolated vertices with probability at least $1 - \epsilon$.

2. Suppose H is a hypergraph where each edge has r vertices and meets at most d other edges. Assume that $d \leq 2^{r-3}$. Prove that H is 2-colorable, i.e. one can color the vertices in red or blue so that no monochromatic edges exist.

3. Do Bernoulli experiment for 20 trials, using a new 1-Yuan coin. Record the result in a string $s_1 s_2 ... s_i ... s_{20}$, where s_i is 1 if the i^{th} trial gets Head, and otherwise is 0.