

Homework 5: due October 21

In all of these questions, the graph in question is $G_{n,p}$.

1. Let $p = \frac{1000}{n}$ and $G = G_{n,p}$. Show that w.h.p. any red-blue coloring of the edges of G contains a mono-chromatic path of length $\frac{n}{1000}$. (Hint: Apply the argument of Section 6.3 of the book to both the red and blue sub-graphs of G to show that if there is no long monochromatic path then there is a pair of large sets S, T such that no edge joins S, T .)
2. Show that w.h.p. the random 3-regular graph $G_{n,3}$ is not planar.
3. Suppose that $1 \gg r \gg \sqrt{\frac{\log n}{n}}$. Show that w.h.p. the diameter of the random geometric graph $G_{\mathcal{X},r} = \Theta\left(\frac{1}{r}\right)$.