Network Algorithms and Dynamics

Homework 2 Due: 02/22/2017

1. Show that $\lambda P_{ext}(\lambda) < 1$ for a G-W process with an offspring distribution $Poisson(\lambda)$. Recall that we used this in the last lecture to show that with high probability, the residual graph after subtracting the giant component is subcritical.

2. Show that in an Erdos-Renyi $G(n, \frac{\lambda}{n})$ graph, with fixed λ, the maximum degree $\Delta \leq \frac{\log n}{\log \log n}$, with high probability.

3. Consider a $G(n, p)$, with $p = \frac{c \log n}{n}$. Show that with high probability, the graph has no connected components of size 2.

4. What is the mean number of triangles in a $G(n, \frac{\lambda}{n})$ graph, as $n \to \infty$, and λ is fixed? Argue that the total number of triangles converges to a Poisson distribution with that mean.