


**From:** Jianxi Gao jianxi.gao@gmail.com   
**Subject:** Re: TOMORROW 10 nov is your deadline for the NW job...do your other 2 reference writers know this fact?  
**Date:** November 10, 2016 at 12:16 PM  
**To:** Gene Stanley hes@bu.edu

JG

Dear Gene,

Here is the new homework.

Jianxi

## Network Science PY 895, Fall 2016

Dr. Jianxi Gao, Prof. H. E. Stanley

### HW 5, due by November 18th (before the class)

#### 1. Simulation

Consider a network growing with the Bianconi-Barabási model model where nodes have uniform fitness distribution  $[0,1]$ .

- (a) Using Matlab to generate a network with  $N = 5,000$  nodes and  $m = 2$ .
- (b) Using Matlab to plot the degree distribution and cumulative degree distribution of the network you produced with and without logbin.
- (c) Calculate the scale free exponent of the network you produced.
- (d) Randomly select 10% of nodes from this network and visualize the subnetwork.

#### 2. Theory

Consider a network growing with the Bianconi-Barabási model model where nodes have two distinct fitnesses,  $\eta = a$  and  $\eta = 1$ . To be specific, let us assume that the fitness follows the double delta distribution

$$\rho(\eta) = \frac{1}{2}\delta(\eta - a) + \frac{1}{2}\delta(\eta - 1) \text{ with } 0 \leq a \leq 1 \quad (1)$$

- a) Calculate the degree exponent, and how it depends on the parameter  $a$ .
- b) Calculate the stationary degree distribution of the network.

Hand-in a **pdf** (no other format is accepted), containing the code, analysis and visualization. Name the file as yourLastName\_HW6.pdf (in my case it would be Gao\_HW6.pdf ) and send it via email.