

## MCMC: Metropolis Lab

### Brief description of my code

Distribution Sampler class:

This class generates and stores samples for any network

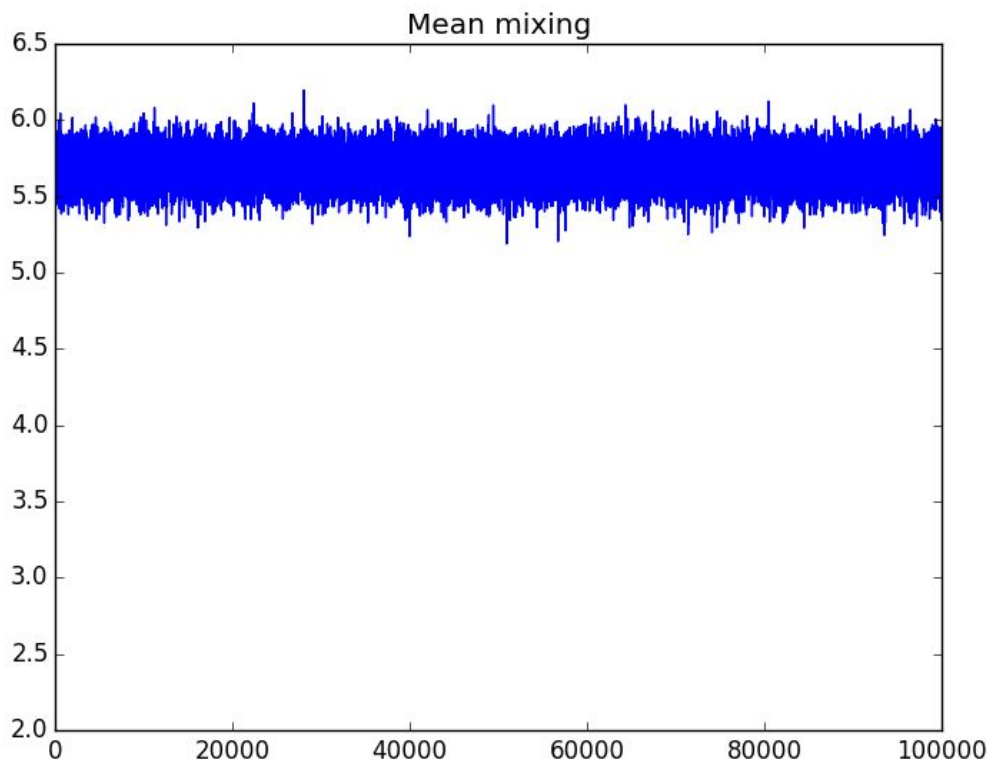
Node class:

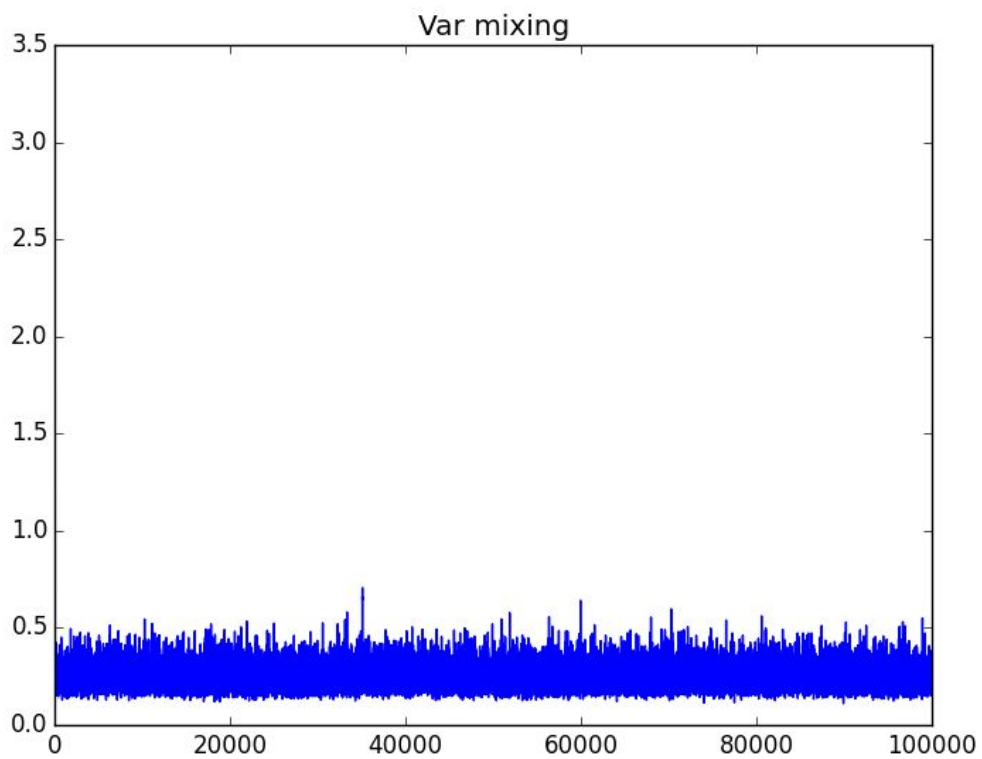
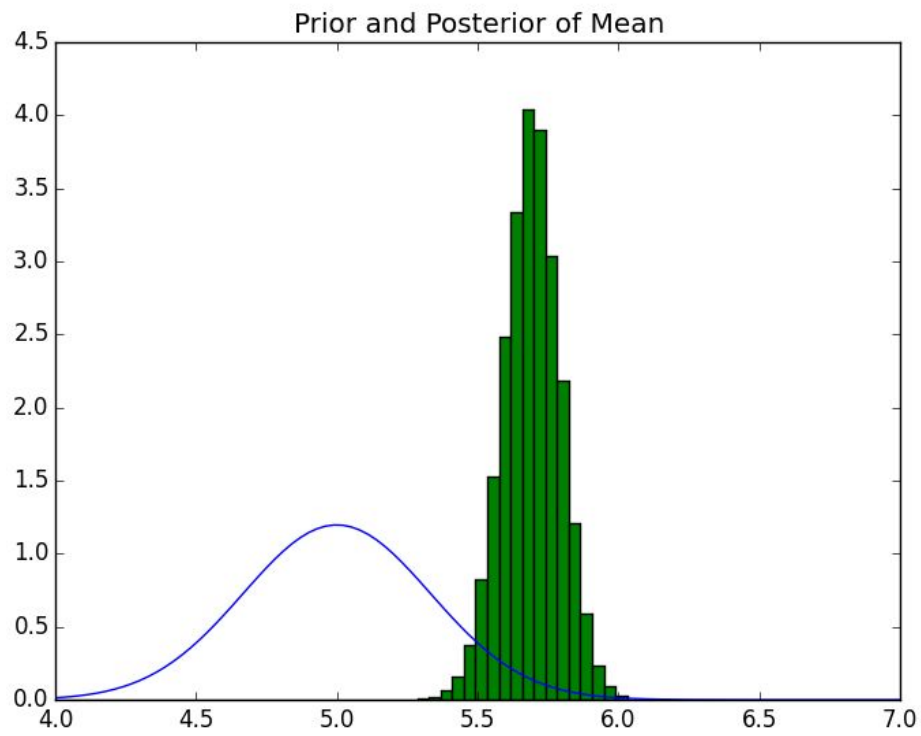
I have a class for each type of node (Normal, InvGamma, etc.). Each node class has a sample method that samples for that specific type of node, a logprob method that returns the log of the probability of that node and a get\_prior\_pdf method that is used to plot the prior distribution.

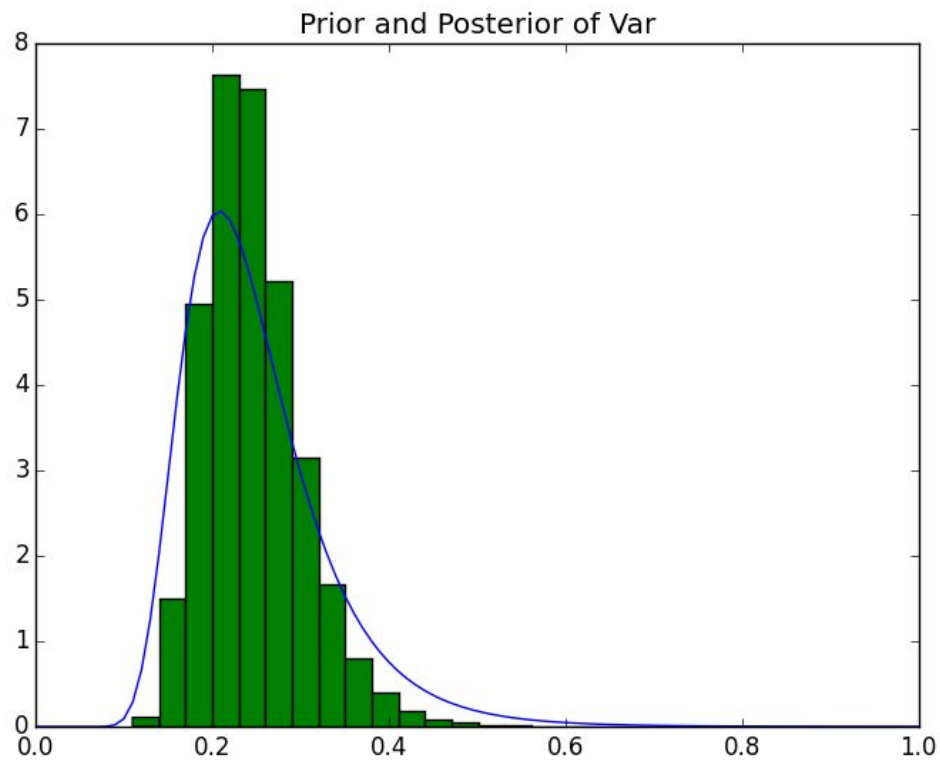
Test.py

This module has all of the network test cases: faculty evaluation network, golfer network, and wacky network.

### Faculty Evaluations Network Results

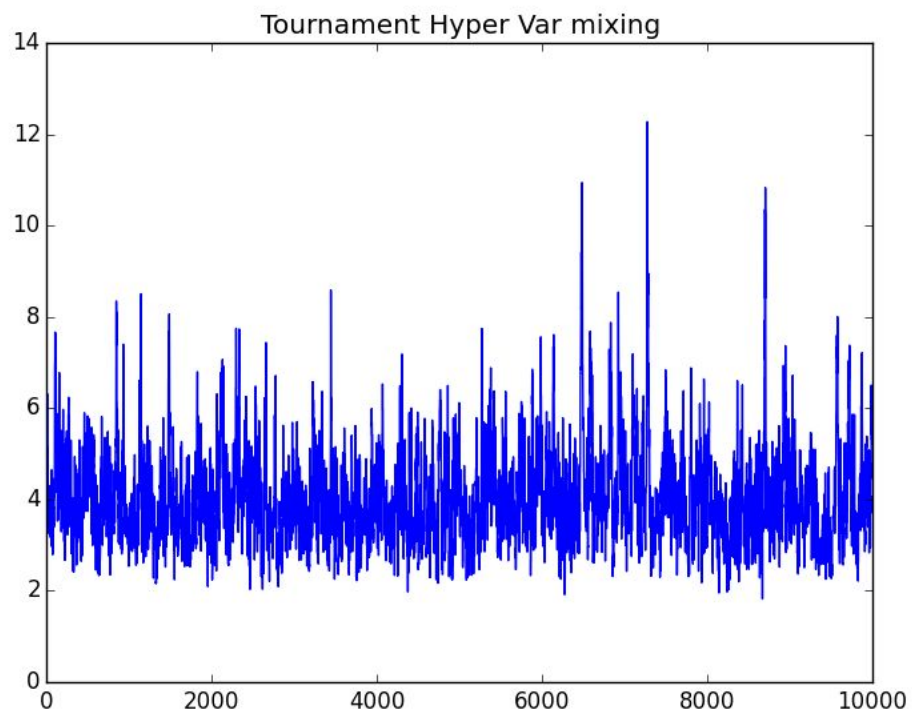
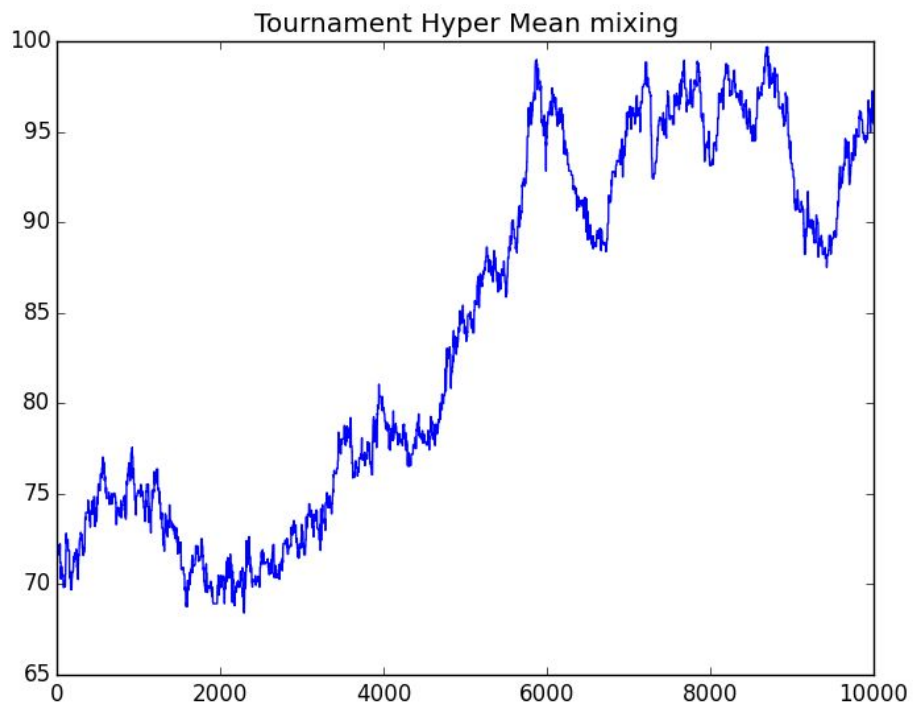


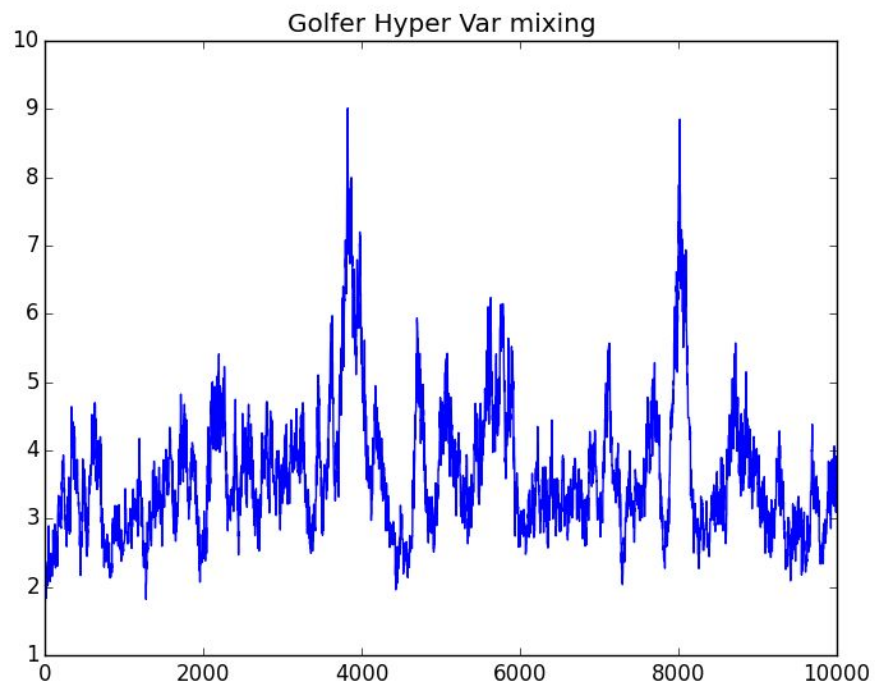
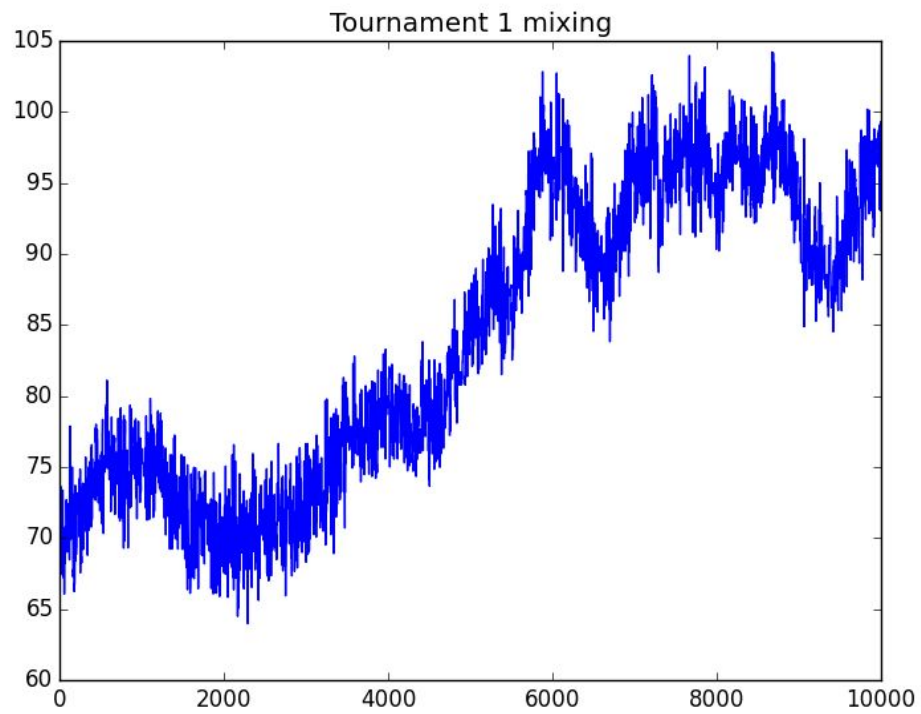


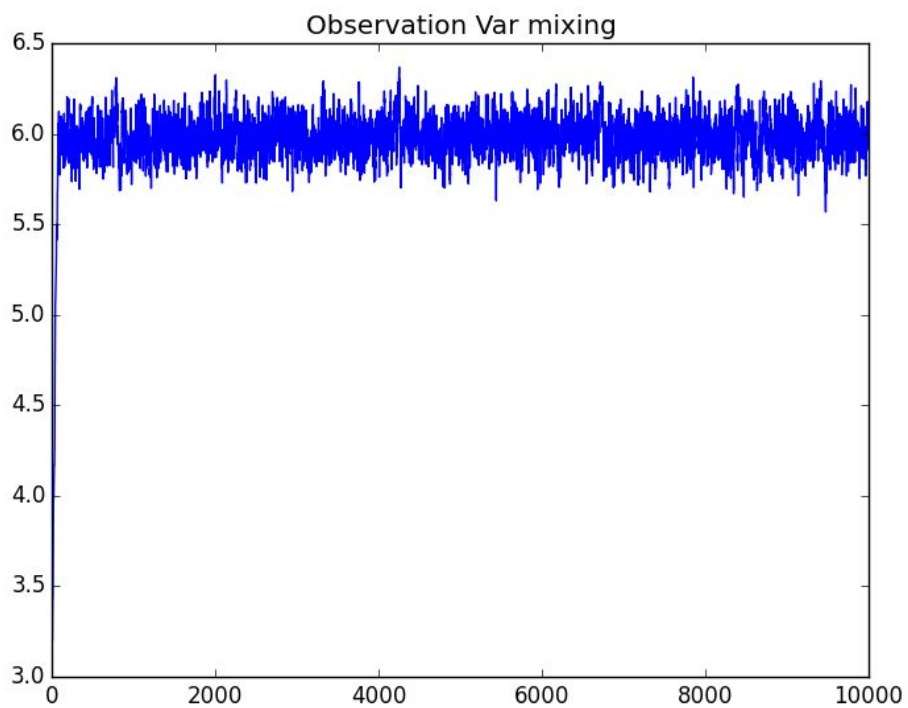
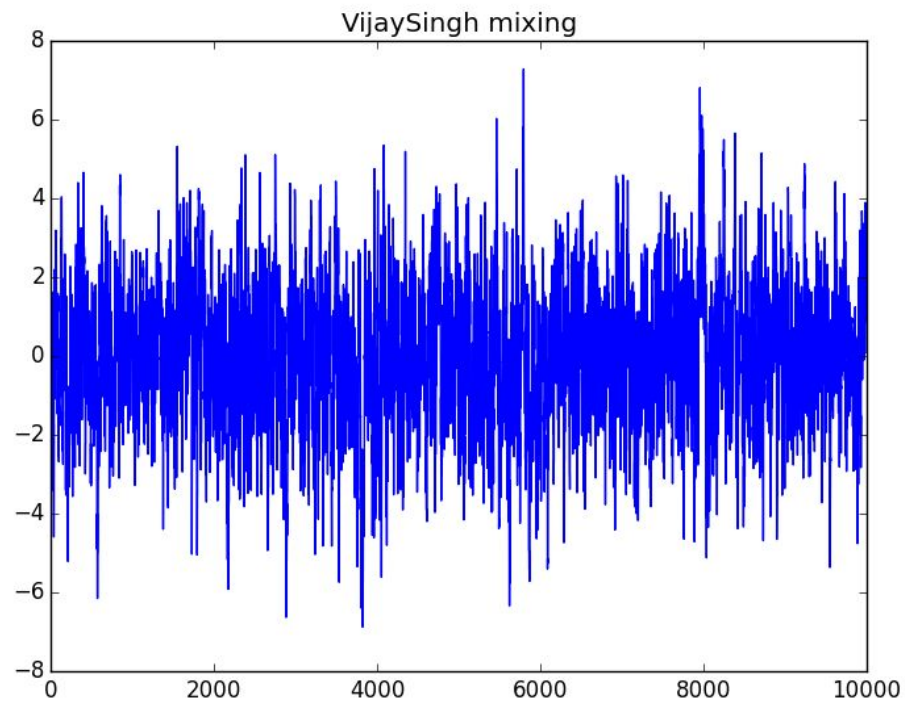


## Golfer Network Results

So funny story, in the process of doing this lab, specifically the golfer network, I found out that my computer doesn't have very much available memory. I have too many pictures saved on my computer that I'm in the process of backing up. As a result, I could only do about 10,000 samples for this network which could be the reason why my results are off.





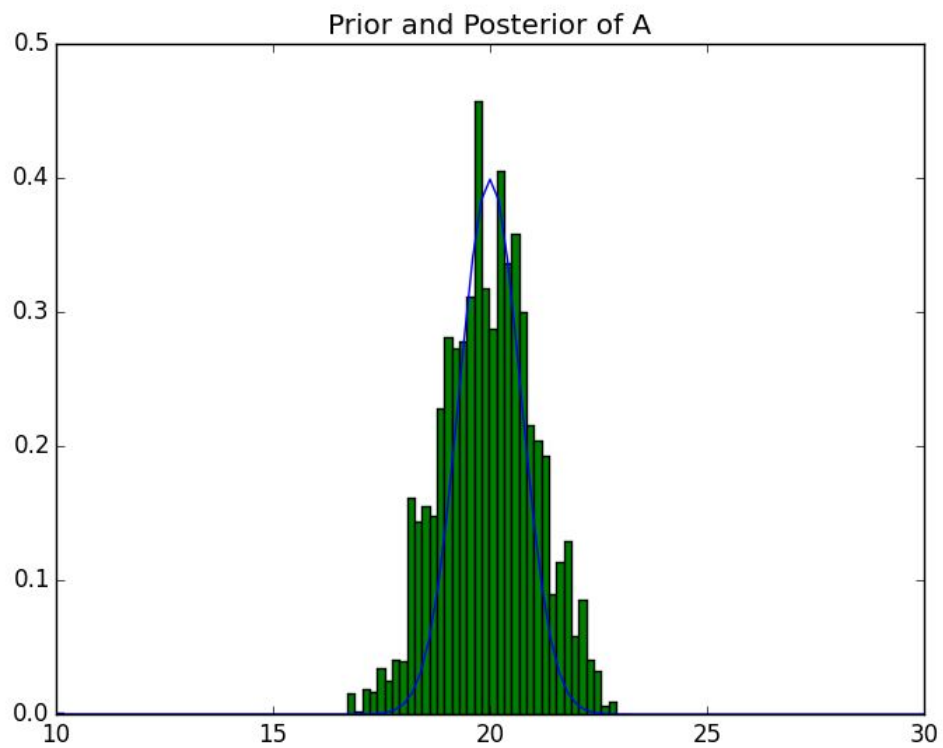
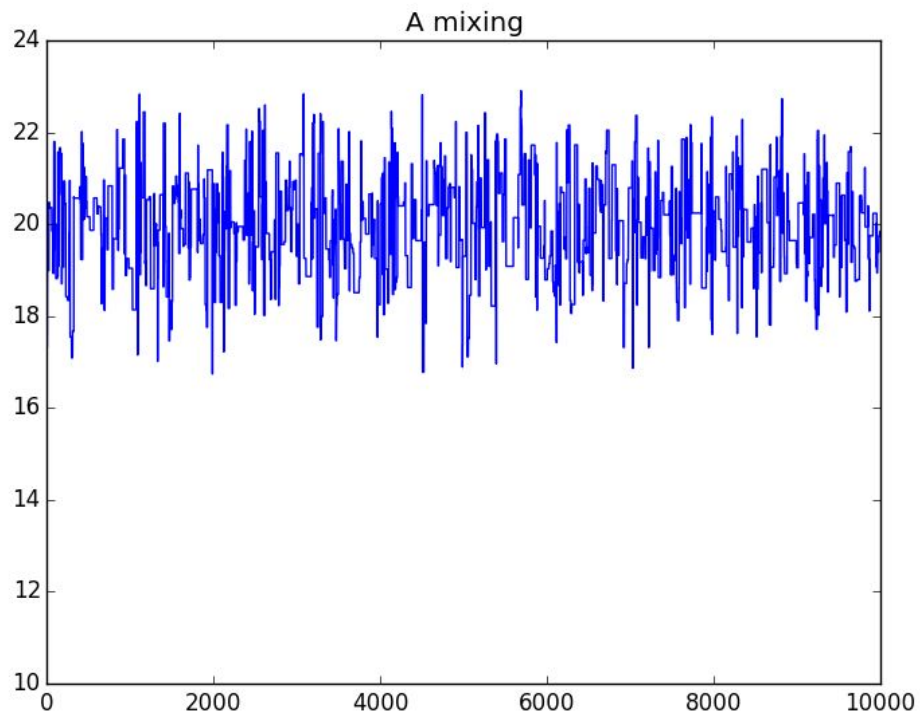


- 1: DavidGossett -0.195045; 90% interval: (-3.263863, 2.833671)  
2: CameronBeckman -0.188058; 90% interval: (-3.238224, 2.848496)

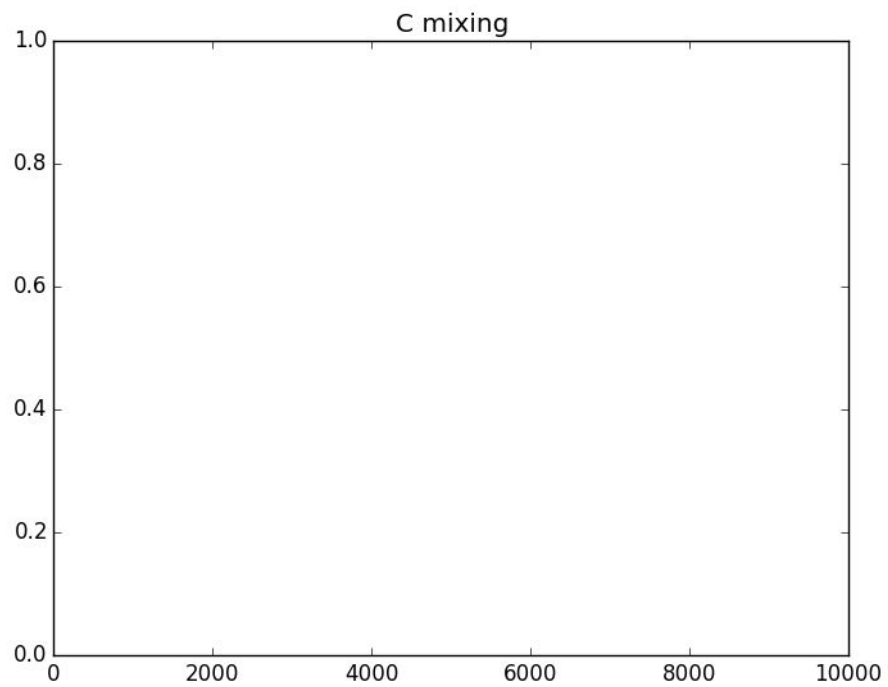
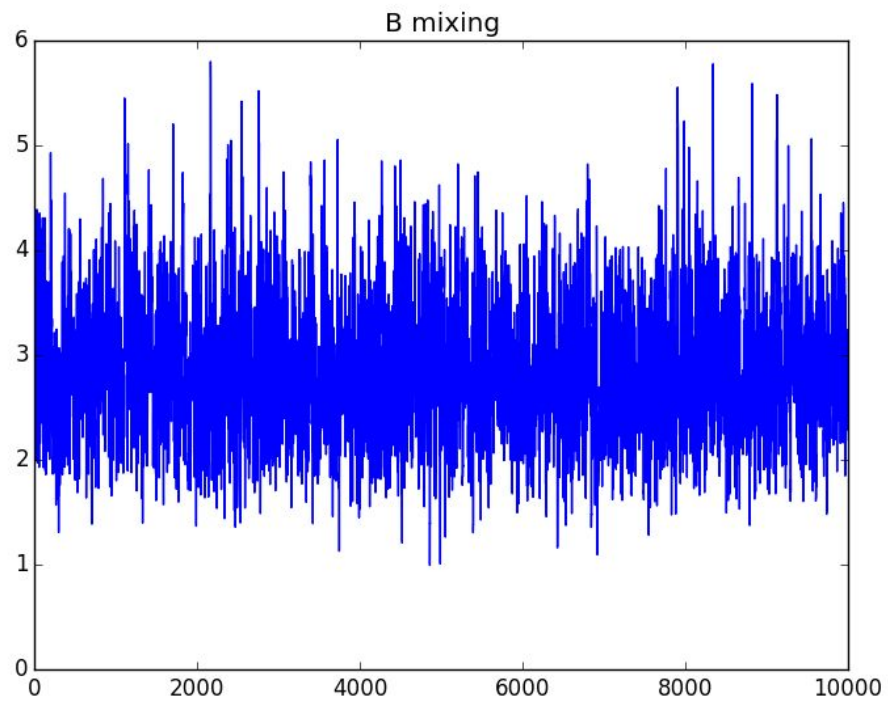
3: JamieRogers -0.159733; 90% interval: (-3.279361, 2.970331)  
4: VanceVeazey -0.152298; 90% interval: (-3.230366, 2.963083)  
5: MikeAustin -0.144889; 90% interval: (-3.195784, 3.132659)  
[...]  
427: VijaySingh 0.025195; 90% interval: (-3.163311, 3.000904)  
[...]  
600: SpikeMcRoy 0.155429; 90% interval: (-2.867198, 3.418534)  
601: MacO'Grady 0.158211; 90% interval: (-2.946087, 3.532271)  
602: TimHerron 0.164435; 90% interval: (-2.679144, 3.327496)  
603: KevinSutherland 0.166778; 90% interval: (-2.927492, 3.414283)  
604: JayOverton 0.170428; 90% interval: (-2.961557, 3.174673)

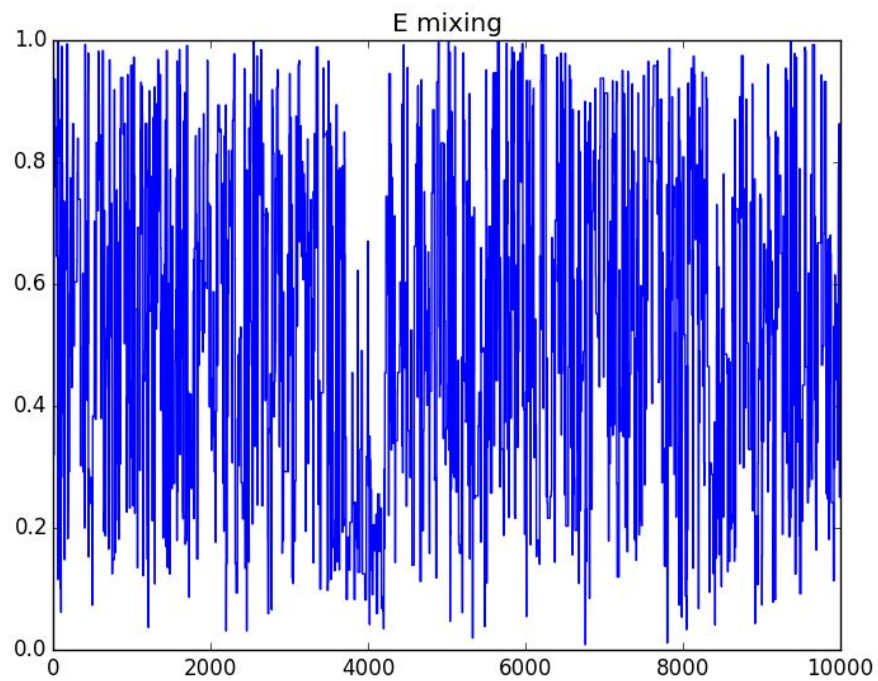
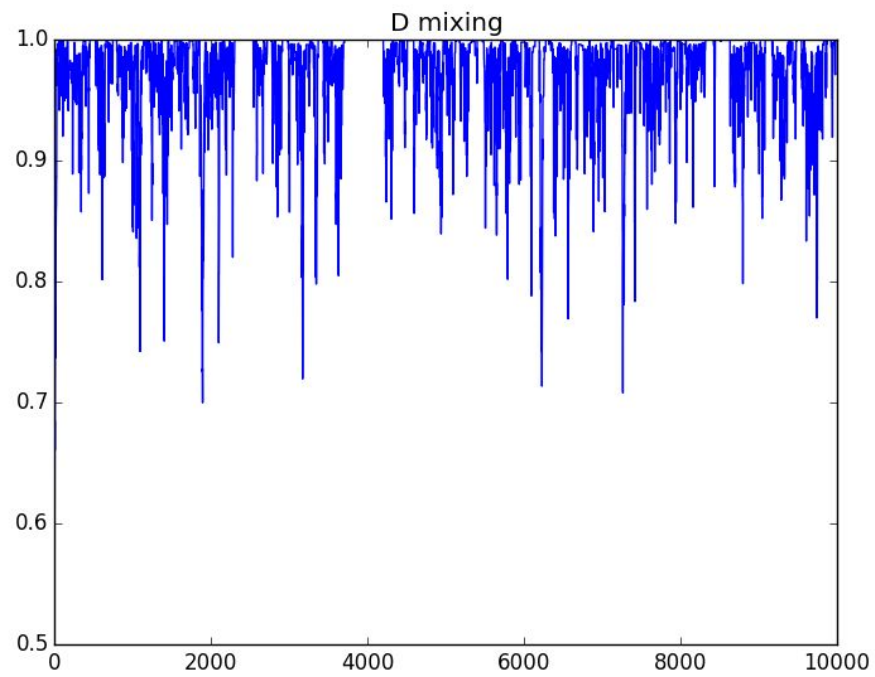
Not the results I was hoping for...

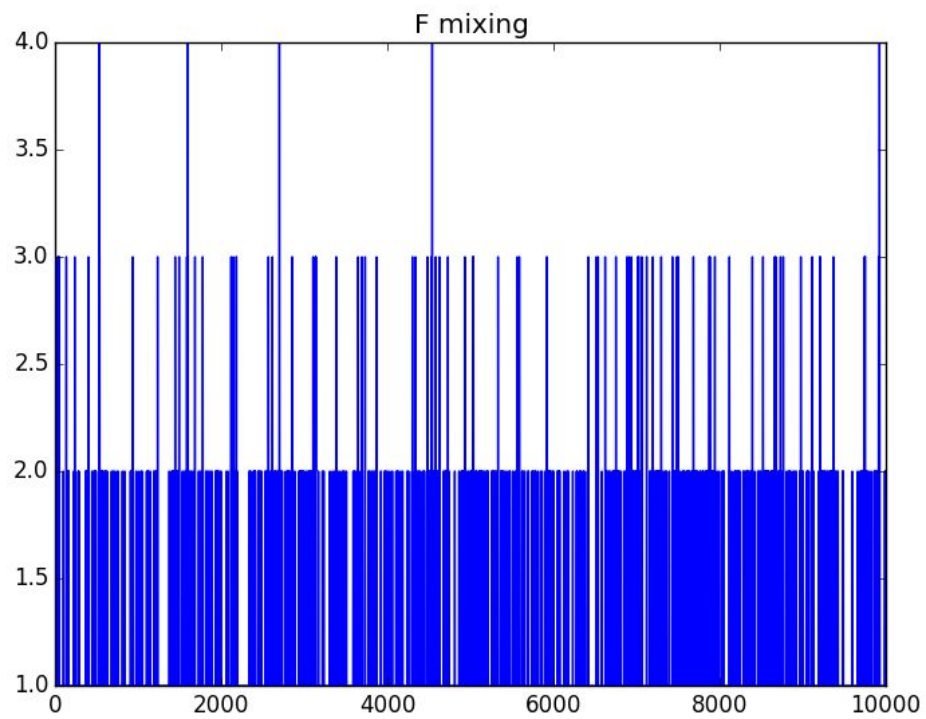
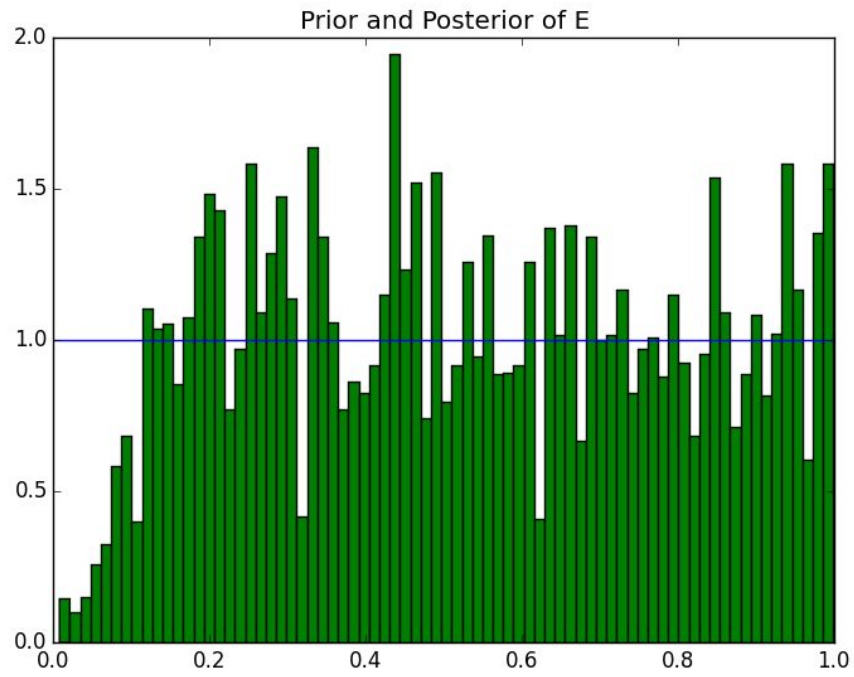
## Wacky Network Results (No observations)

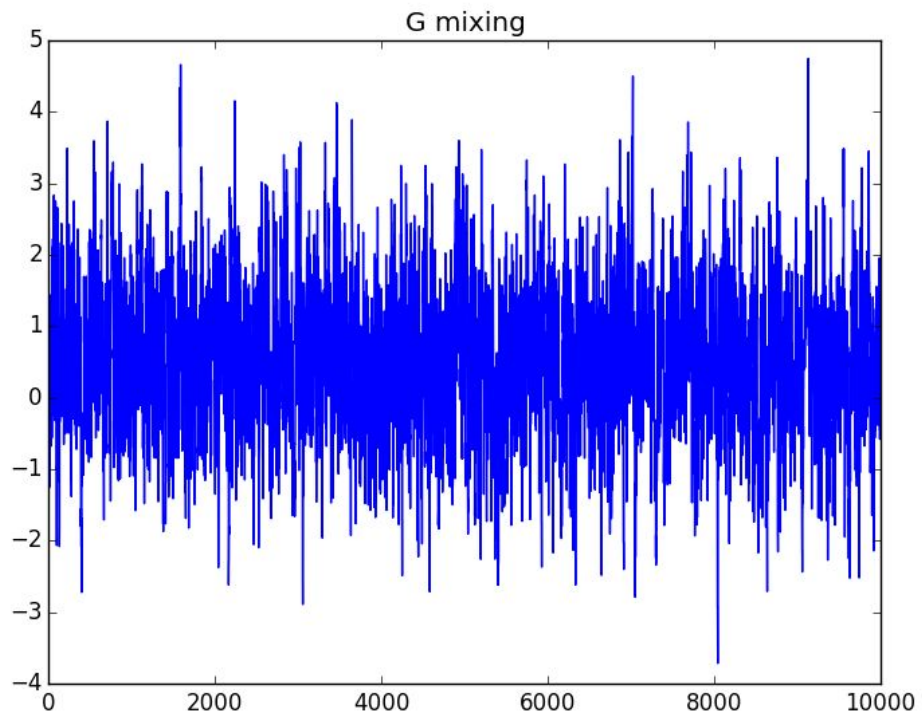




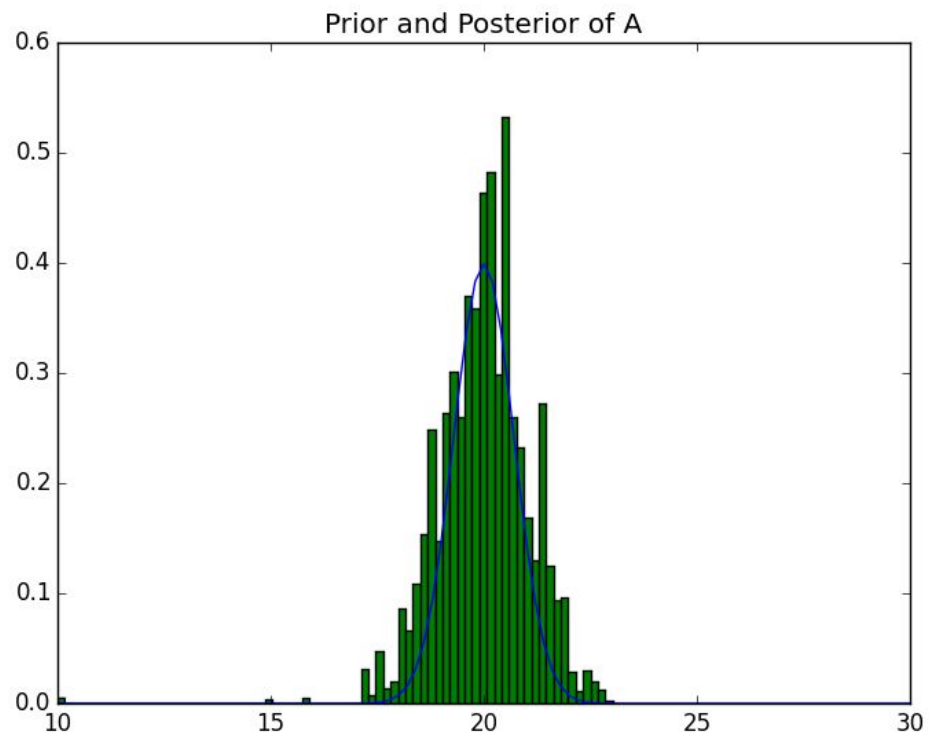
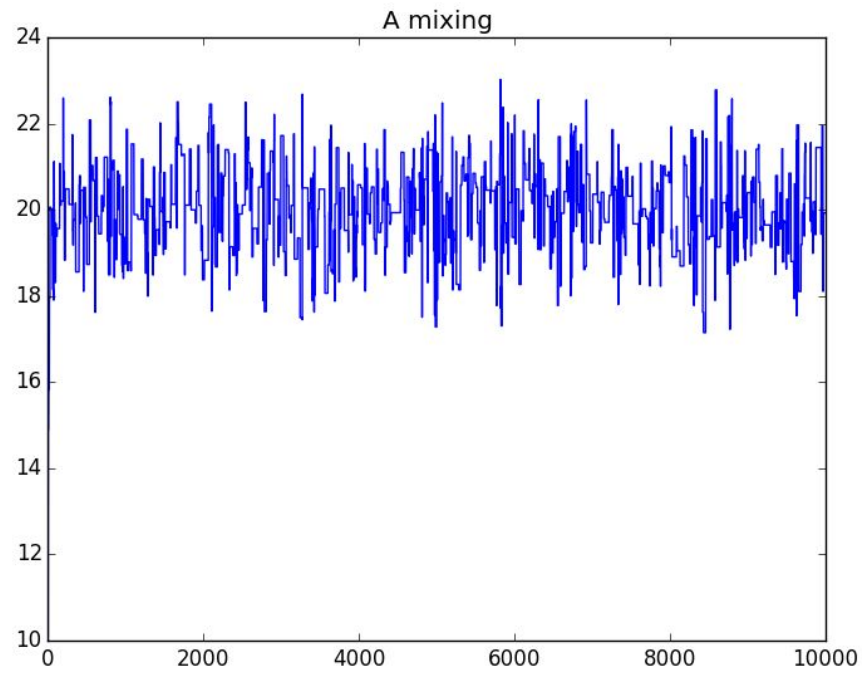


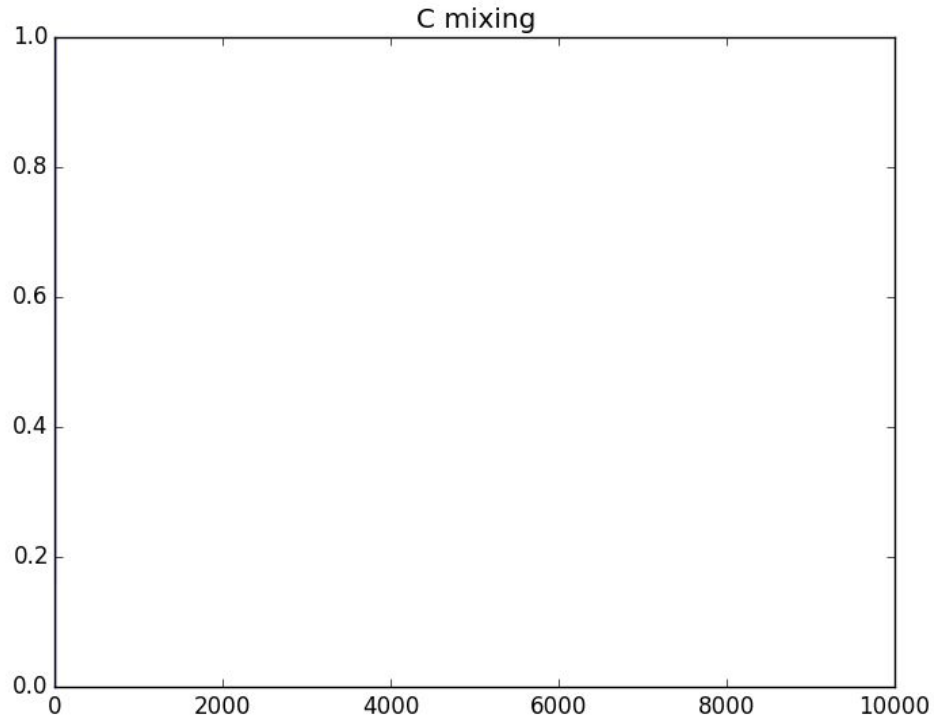
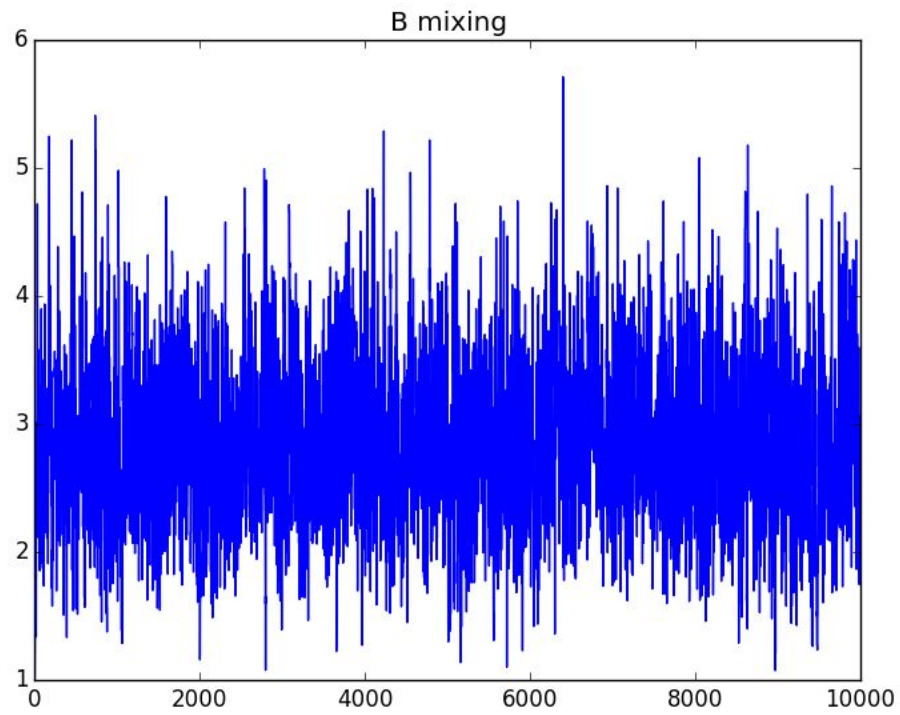


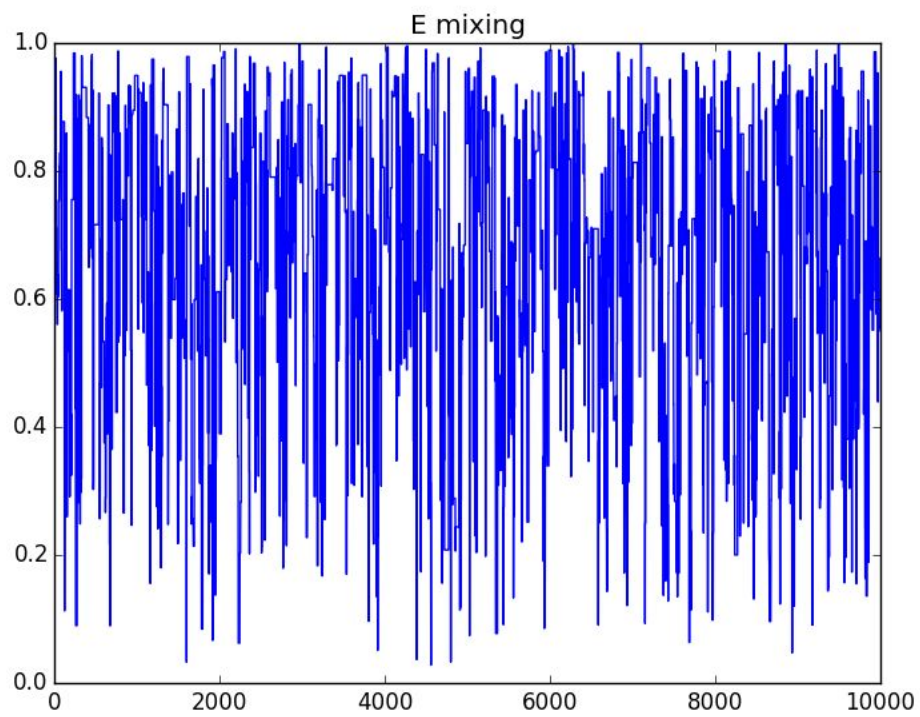
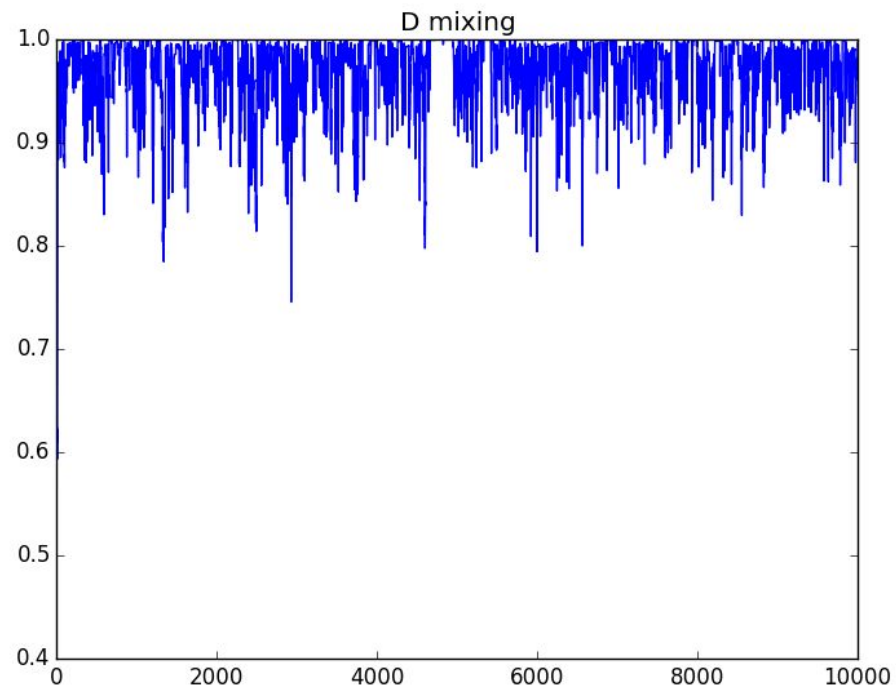


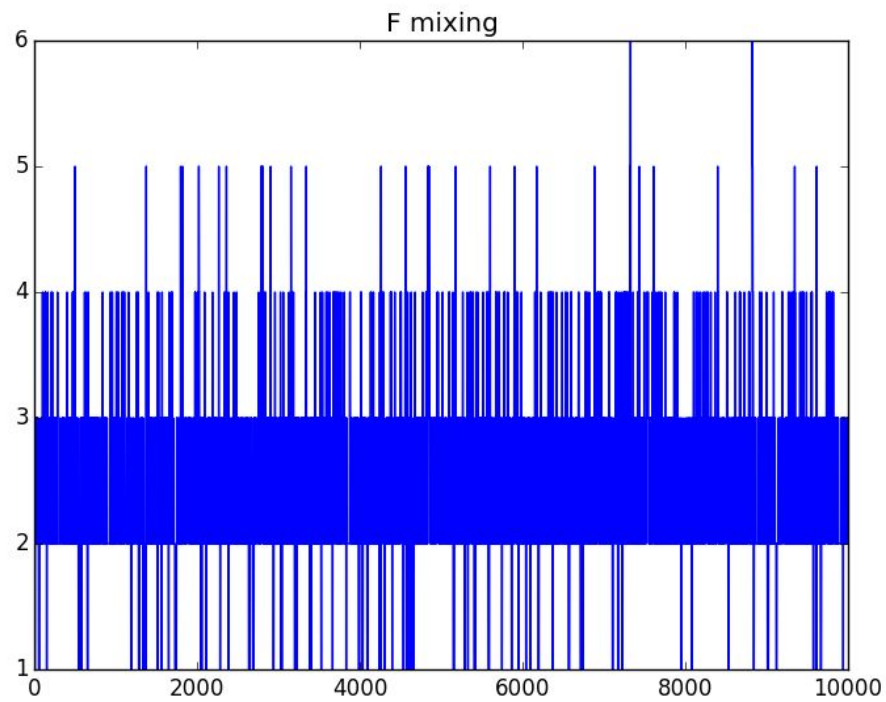
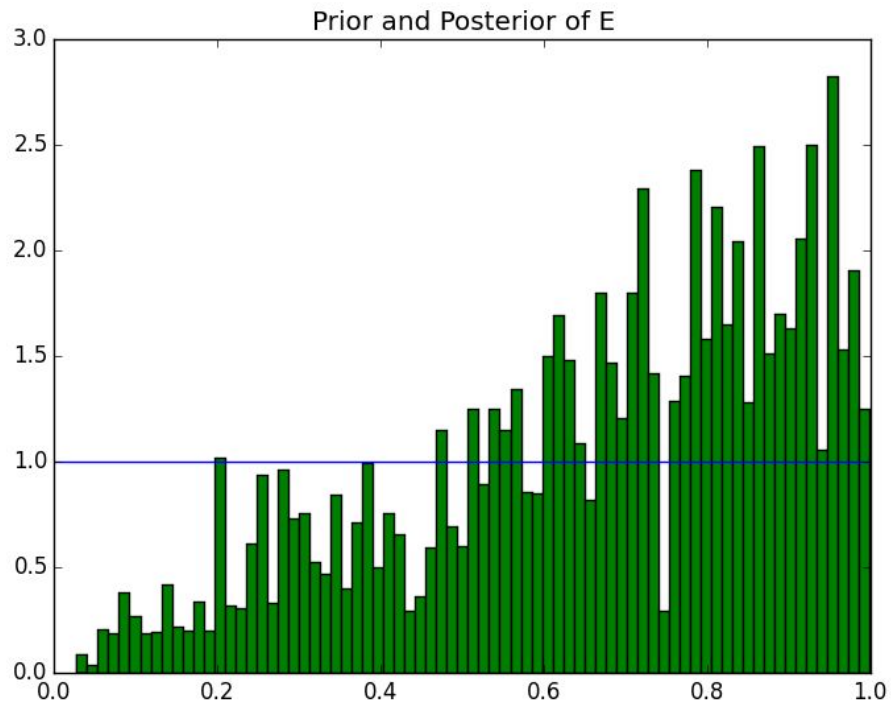


## Wacky Network Results (G observed)

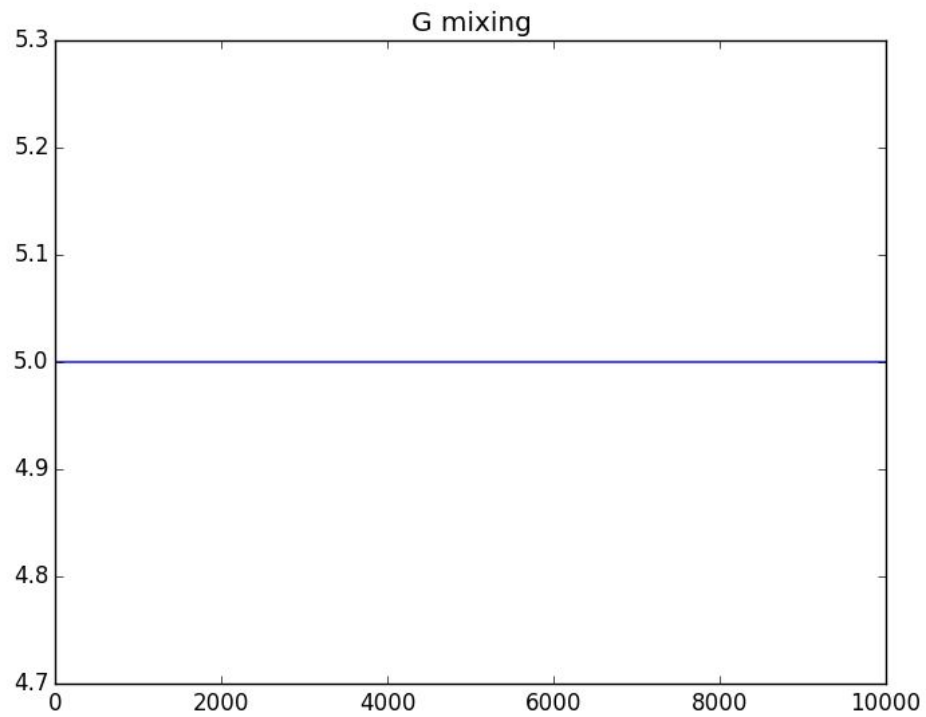




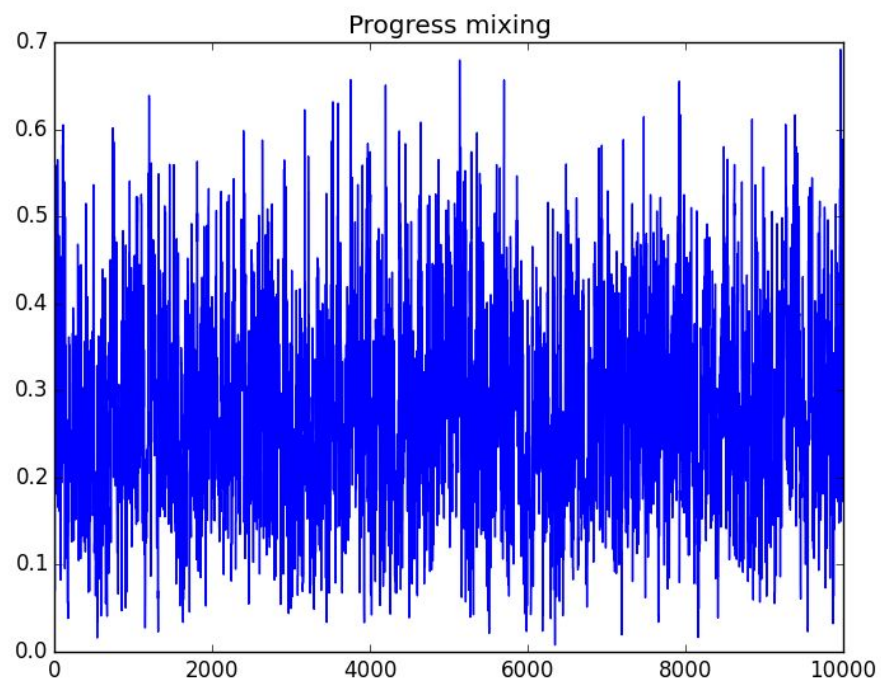


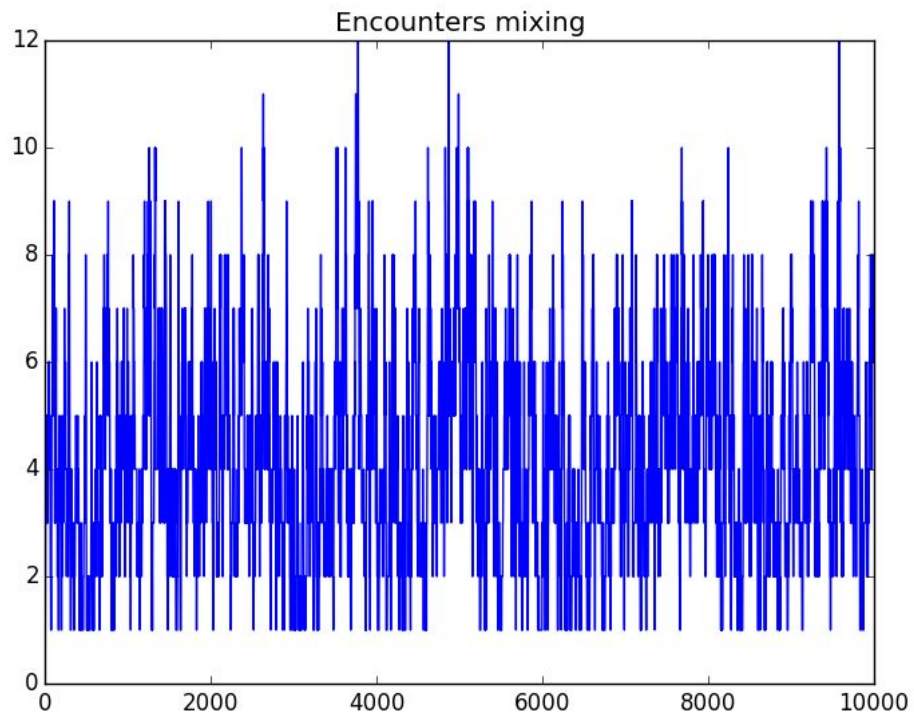






## Progress/Encounters Network





Median for encounters: 4.0

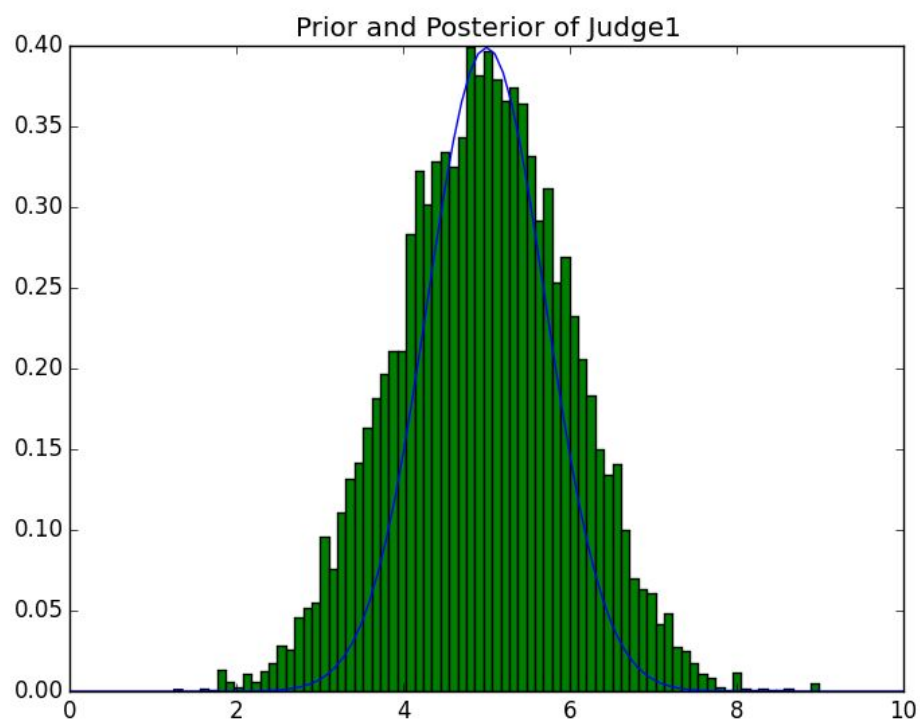
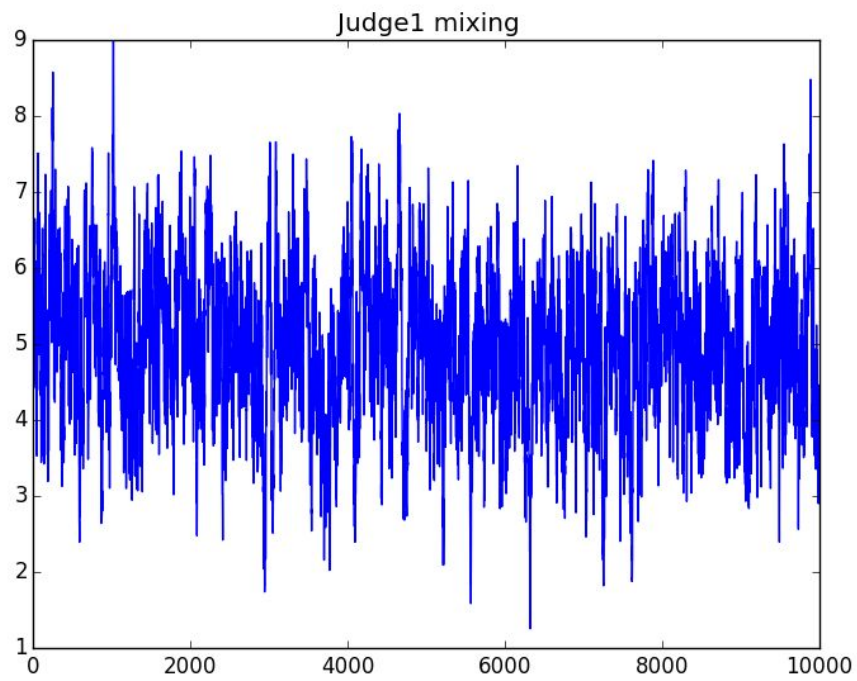
### **Judge/Score Network**

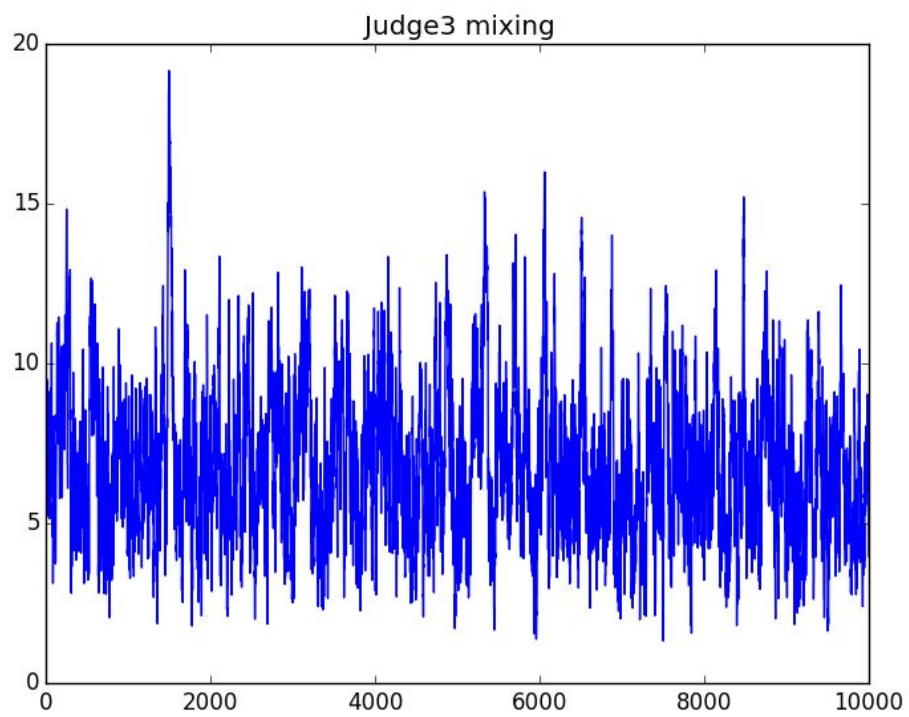
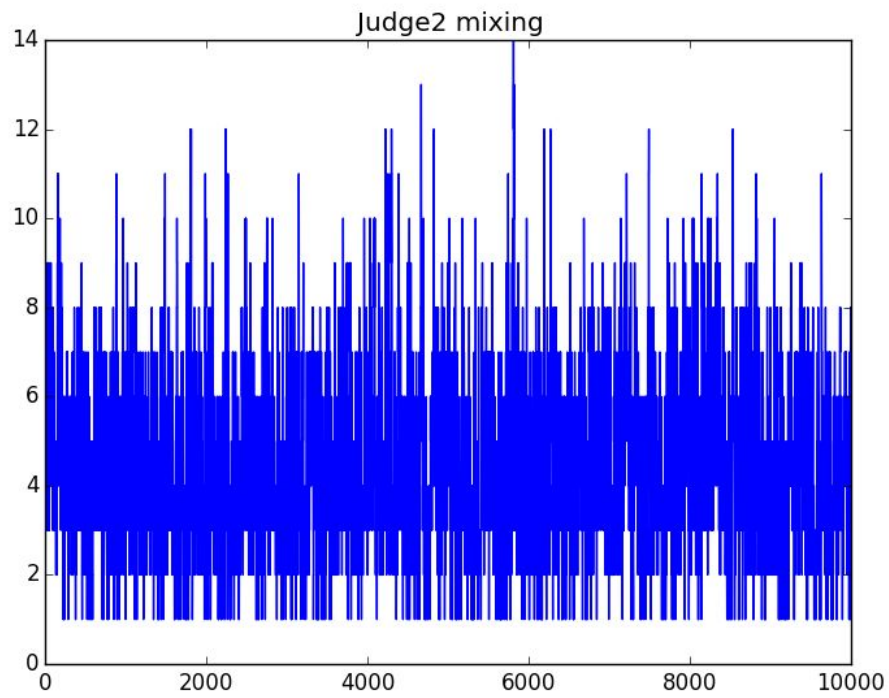
Judge1: Normal(mean=5, var=1)

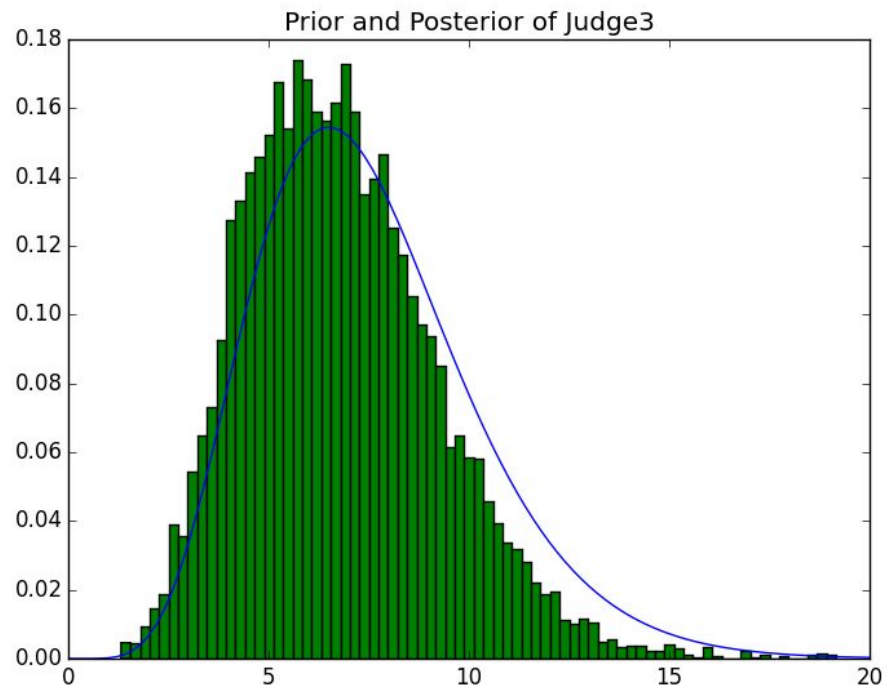
Judge2: Poisson(rate=5)

Judge3: Gamma(alpha=7.5, beta=1)

Score: Normal(mean=(Judge1+Judge2+Judge3)/3, var=0.5)







### My Network

A:  $\text{Poisson}(\text{rate}=6)$

B:  $\text{Gamma}(\alpha=3, \beta=\sqrt{A})$

Query: what is the median of B?

Answer:  $\sim 1.5$

