Assignment 2b

1) Consider the random graph G(n,p) with mean degree c. Also consider that S is the fraction of the network occupied by the giant component (20 pts).

a. Calculate the probability that a vertex of degree k belongs to a small component as a function of S.

b. Show that the fraction of vertices in small components that have degree k is $\frac{e^{-c}c^{k}(1-S)^{k-1}}{k!}$.

2) The entropy H of a probability distribution p_i, $i \in \{1,2,\ldots,n\}$ is given by: $H(P) = -\sum_{i=1}^{n} p_i \log(p_i)$. Considering a network, its entropy is essentially the entropy of the corresponding degree distribution. Argue, quantitatively (preferred) or qualitatively, that if G_1 is a k-regular graph and G_2 is an Erdos-Renyi graph, that $H(G_1)<H(G_2)$. (20 pts)