Muhammed Orhun Gale Network Science Assignment#1 Report

Q1)

Even though my favorite book series is Lord of the Rings when I take mangas (Japanese comic books) as books, I cannot really say which one of the LotR and One Piece is my favorite but for this time I go with One Piece which is a manga series which is about pirates.

Since One Piece started in 1997 and has over 1000 chapters, even the pirate groups can be nodes but there are many cross interactions too therefore, the nodes will probably be characters. Edges can be probably about friendship-enmity and while positive weights indicate friendship, negative weights can indicate enmity. Since there are lots of characters and interactions over time it would be a really dense graph. Since the main character is Luffy and the story is running around his crew Mugiwara Pirates, they would be on the center of the network and connect other pirate groups therefore, it can be said that their centrality measures would be maximum. Also, for other pirate/marine groups, generally their captain is involved in fights, their captains would be in the center of these specific groups with significantly high centrality measures. Therefore, this network would be a disassortative network which has a Mugiwara crew in the center of the network and other captains/commanders in the center of other hubs.

The top character on the network would be Monkey D. Luffy, since he is the main character and had many interactions with different characters. Second top character would be Gol D. Roger, namely King of the Pirates because he is the most known man in the One Piece universe. Third most character would be Monkey D. Dragon since he is the most wanted man in the universe.

Q2)

$$< L >= \sum_{L=0}^{\frac{N(N-1)}{2}} LP(L) = p\frac{N(N-1)}{2}$$

Expected number of edges in a random network is calculated by multiplying the probability of existence of an edge with the maximum possible number of edges. It can be thought of as a probability distribution over indicator variables of all possible edges. (i.e. if the edge occurs it is 1 otherwise it is 0)

Then,
Max # possible of edges = (N*(N-1)) / 2 = (1000 * 999) / 2 = 499500

If p = 1/(1000) then expected number of edges is,

499500/1000 = 499.5