

Q1) Consider a network that you may build to study interactions between the characters of your favorite book. What would be the nodes and edges on this network? What type of network you will have at the end? Please justify your answer.

CS414 – 10pt
CS514 – 10pt

Bonus +3: Name your book and share your guesses about the top-3 character on the network with the highest strength. Explain why?

Q2) Consider an ER network with $N=1000$ nodes and connection probability between two nodes is equal to $p=10^{-3}$

CS414 – 15pt
CS514 – 10pt

- What is the expected number of edges, $\langle E \rangle$?

CS414 – 25pt
CS514 – 20pt

- Implement the details of the function **simulate_erdos_renyi(N,p)** in the **NetworkAssignment1** IPython notebook. You will need to simulate 100 random initializations for $p=0.05$, $p=0.1$ and $p=0.3$ and plot distributions for number of edges. *Feel free to play around with different p values as well.*

Q3) Follow the instructions on **NetworkAssignment1** IPython notebook. You will need to download a dataset by requesting data from a platform you have been using, compute network characteristics for each network and visualize these networks on Gephi. You are also asked to plot degree distribution and analyze the properties of network to decide whether it is assortative or disassortative. Please explain the criteria you selected to set properties of nodes and edges in the visualization.

CS414 – 50pt
CS514 – 50pt

Q4) Consider a Cayley tree with the root node having degree equal to $k=5$. If the longest path on that tree is length $d=8$:

CS414 – +5pt
CS514 – 10pt

- compute the number of nodes on that graph.
- visualize that tree
- write down a formula for number of nodes for any given k and d .

Please share your assignment following the format below.

- Name your file as a compressed file **yourSUID-hw1**
- Share both IPython notebooks without removing the result cells.
- Questions that don't involve coding, please report your answers in a PDF file as a report.