Network Science
Assignment 3

All results must be submitted through a well-documented Jupyter Notebook.

1. Consider a real-world graph of at least 1000 nodes. Implement the (a) Configuration Model as well as the (b) Edge-Swapping strategy for generating a random graph to preserve the degree sequence of a real-world graph. Plot the original degree distribution as well as that generated through these strategies (averaged over 100 instances). **[5+5]**

2. Plot the degree correlations of the real-world network using k_{nn} vs k plot. Compare the degree correlations with that of the corresponding random graph (averaged over 100 instances). **[5]**

3. Write a strategy to generate all possible unique 'three node connected subgraphs' in a directed graphs. For the *a real-world directed network of your choice*, compute the Z-score of for each of these vis-à-vis its random counterpart. State which of the subgraphs may be considered as motifs/anti-motifs. **[5+5+5]**