Network Science
Spring 2024
Problem sheet 1

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1. Barabasi Section 2.12 Konigsberg Problem

2. Consider a path graph with N nodes, so the links are 1-2,2-3,3-4,...,$(N-1)$-N. Find the average distance for the graph.

3. Consider a path graph with N nodes where N is odd and greater than one. Add a link between an end-node (a node with degree=1) and the node in the center of the graph.

   i) What is the diameter of the new graph?

   ii) What are the local clustering coefficients C_i of this new graph?

4. Consider an undirected graph with N nodes where each node has degree 4 (and there are no self-loops and a maximum of 1 link between a pair of nodes).

   i. Sketch a graph with $N = 6$ which satisfies this condition.

   ii. Compute the clustering coefficient for each node when $N = 6$. (You may assume that the graph you found in (i) is the only possible one.)

5. Create the graph shown below in NetworkX. Compute the average clustering coefficient, $\overline{C}$ in NetworkX and the global clustering coefficient, C_g by hand.