

## Exercises for Statistical analysis of network data – Sheet 3

1. Is the graph  $C_4$  the cycle graph on 4 nodes strictly balanced?
2. Is the graph of a tadpole of a cycle with 5 nodes joined to a 3-node tail, e.g. a graph on 5+3-1 vertices strictly balanced?
3. Count the number of triangles in the graph below, excluding the large connected components of the biggest connected component.

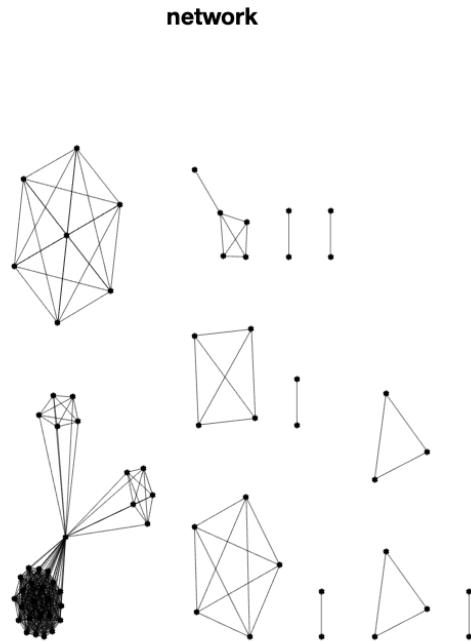


Figure 1: Plot of a graph.

4. Assume that  $G$  is an Erdos-Renyi graph on  $n$  nodes. Determine the large sample approximation to the distribution of  $X_{C_4}(G)$ . Choose the success probability of the Erdos-Renyi graph so that a known limit arises.
5. Assume that  $G$  is a Stochastic Blockmodel with 2 groups on  $n$  nodes. Determine the large sample approximation to the distribution of  $X_{C_4}(G)$ . Choose the success probability of the Erdos-Renyi graph so that a known limit arises.
6. What is the automorphosm group of  $K_4$ ? How large it is?