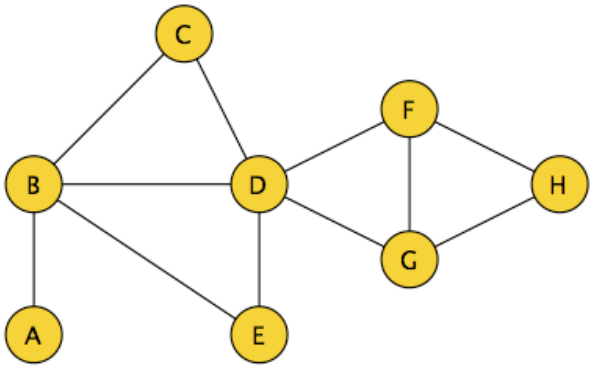
Home Assignment 2

Send your completed assignment in PDF Format via e-mail to Gabi gabriele.zorn-pauli AT@ tugraz.at. You are required to format the subject of your e-mail in the following way: "[WSWT] HW2 YOUR_MATR_NR" e.g. "[WSWT] HW2 0799999".

For **each task**, you are **required to provide a brief explanation** of how you obtained your solution (e.g. "the shortest path is n, and it goes through X-Y-Z" or "the degree of the local bridge U-W is m because …").

1. Given the following Graph G



2. Calculate

   - The diameter (the longest shortest path)
   - The degree of all nodes
   - The average degree k
   - The maximum number of potential edges
   - The average pairwise distance
   - The clustering coefficient C for node B
   - The number of cycles of length 4
   - The number of cycles of length 5
   - The shortest path between A and H
   - The degree of the local bridge "D-E"
   - The degree of the local bridge "A-B"

3. Draw the corresponding degree distribution p(k)

4. Name the two most vulnerable nodes in the network with respect to connectivity. Describe the effects on connectivity.

5. Assuming preferential attachment, which node is most likely to receive a link from a newly added node?

6. Assuming assortativity with respect to node degree, to which set of nodes is a **new node I** with an anticipated degree of 3 most likely to set links to (you can neglect the degree effects of actually adding the node)?

7. Calculate the geodesic path B-F under the assumption that the edge between node B-D and D-F is deleted.

8. Assuming that the edge between node D and G is deleted, name at least two bridges (bridges in an absolute sense).

Optional Tasks (no points)

9. Name an actor that has a Bacon Number of 2

10. Name a scientist that has an Erdös Number of 2