Lecture Introduction to Network Science
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BIONETS

Assignment 1 – Introduction to Graph Theory

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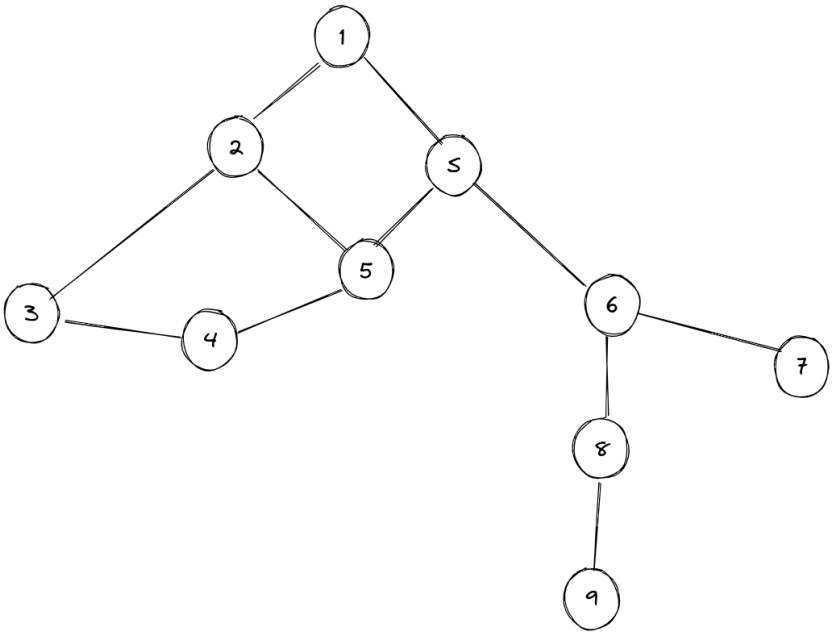
Question 1

Refer back to the example of social networks from the lecture (Slide 17).

- In such social networks, what are nodes, what are the edges?
- Does it make sense to model social networks as directed graphs? Why? Why not?
- How could one include edge weights in social networks?
- Does it make sense to model social networks with self-loops? Why? Why not?
- How can we interpret connected components in social networks?

Question 2

List the nodes of the following graph in order of BFS and DFS traversal starting from source node s. Ties are broken by considering nodes with smaller IDs first.



Question 3

a) Implement DFS and BFS using `networkx`. Your implementation should be able to handle both directed and undirected networks.

b) Verify your implementation using the graph depicted in Question 2.

c) State the runtime complexity of BFS and DFS in big-O notation and give a short justification for your answer.