Algorithms in the Time of COVID19

DFS[1] *- Recitation*[2] *13*

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[2] Hand-written notes available at: https://www.dropbox.com/sh/x1z104c22d51pox/AACiJdDSKe2SDZw3qNljNApka?dl=0

We now know how to use depth first search to answer:

- whether a graph is connected or not
- find all cut vertices
- find a topological ordering of the vertices in a given DAG

Cut vertices

Topological ordering

Problem 1. Let $G = (V, E)$ be an undirected graph with n vertices and m edges containing two vertices s and t such that the distance between s and t is strictly greater than $n/2$.

1. Prove that there must exist some vertex v, not equal to either s or t, such that there is no path from s to t after deleting v.
2. Give an algorithm of $O(m + n)$ complexity to find such a node v.

Problem 2. Given a undirected connected graph $G = (V, E)$, design an algorithm for finding a minimal number of edges $E' \subset E$ such that the graph $(V, E - E')$ is acyclic.