Theory of Computation, CSCI 438 spring 2023
Class nondeterministic polynomial time, NP, pg. 292-298
NP-Completeness, pg. 299-311
April 27

1. Prove that HAMPATH $\in$ NP

    HAMPATH = {<G, s, t> | G is a directed graph that contains a directed path from source vertex s to target vertex t and the path passes through every vertex in G exactly once}

2. Prove that CLIQUE $\in$ NP

CLIQUE = {<G, k> | G is an undirected graph with a k-clique}

Clique – all nodes in the clique are completely connected

k-clique – a clique with k nodes.

3. Theorem 7.20 (page 294) A language is in NP iff it is decided by some nondeterministic polynomial time Turing machine.

Problems in NP:

HAMPATH = {<G, s, t> | G is a directed graph that contains a directed path from source vertex s to target vertex t and the path passes through every vertex in G exactly once}

COMPOSITES = {x | x=pq, for integers p, q > 1}

CLIQUE = {<G, k> | G is an undirected graph with a k-clique}

Clique – all nodes in the clique are completely connected

k-clique – a clique with k nodes.

SUBSET-SUM = {<S, t> | S = $\{x_1, \ldots, x_k\}$, and for some $\{y_1, \ldots, y_k\} \subseteq \{x_1, \ldots, x_k\} \Sigma y_i = t$ }

Note that S and its subset are multi-sets.