CECS 528, Learning Outcome Assessment 12b MCQ's, May 5th, Spring 2023, Dr. Ebert

Problems

1. Which of the following decision problems is most likely *not* in complexity class P?

   (a) An instance of `5-Clique` is a simple graph G and the problem is to decide if G has a 5-clique.

   (b) An instance of `5SAT` is a set $\mathcal{C}$ of disjunctive clauses, each having 5 literals, and the problem is to decide if there is an assignment of the variables that satisfies each clause of $\mathcal{C}$.

   (c) An instance of `Perfect Matching` is a bipartite graph $G = (U, V, E)$, with $n = |U| = |V|$, and the problem is to decide if G has a matching of size equal to n.

   (d) An instance of `5-Path` is a simple graph G and the problem is to decide if G has a simple path of length equal to 5.

2. Which of the following decision problems is most likely *not* in complexity class `NP`.

   (a) An instance of `UNSAT` is a Boolean formula F, and the problem is to decide if F is unsatisfiable.

   (b) `2SAT`

   (c) An instance of `Perfect Matching` is a bipartite graph $G = (U, V, E)$, with $n = |U| = |V|$, and the problem is to decide if G has a matching of size equal to n.

   (d) All of the above are provably in `NP`.

3. If we know that $A \leq_m^p B$ and B is `NP`-complete, then it must be true that

   (a) A is `NP`-complete.

   (b) A is in `NP`.

   (c) B is mapping reducible to `SAT`.

   (d) both a and b are true.