CS 325 - NP-Complete Practice Problems

1. Is the 3-SAT problem known to be NP-complete, or is that only conjectured? Is it known whether the 3-SAT problem is in the class P? Is it known whether the 3-SAT problem is in the class NP?

2. What is the definition of the class P?

3. What is the definition of the class NP?

4. What is the definition of a polynomial time transformation from *A* to *B*?

5. What is the definition of an NP-complete problem? How do you prove that a problem is NP-complete?

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6. **SET-PARTITION**. Given a set S can we partition S into two sets X and $\overline{X}$ = S-X (both sets are nonempty) such that the sum of the elements in X equals the sum of the elements in S-X. That is

$$\sum_{y \in X} y = \sum_{y \in X - S} y$$

Prove that SET-PARTITION is in NP-complete. You may use the fact that SUBSET-SUM is in NP-Complete. Recall SUBSET-SUM, given a set S of numbers and a target t, determine if there is a subset S′ of S such that the sum of the elements in S′ equals the target.