

Practice Problems on NP-completeness

CS:3330 Fall 2015

1. The problem COMPOSITE is the decision problem that takes as input a positive integer n and asks if n is a composite. Show that COMPOSITE is in NP.
2. Do you think COMPOSITE is NP-complete? Explain your answer.
3. For a problem X , define its *complement* as the problem

$$\bar{X} = \{x \in \{0,1\}^* \mid x \notin X\}.$$

- (Thus yes-instances of X are no-instances of \bar{X} and no-instances of X are yes -instances of \bar{X} .) If $X \in P$, then do you think \bar{X} is also in P ? Explain your answer.
4. If $X \in NP$, then do you think \bar{X} is also in NP? Explain your answer.
 5. Problems 1 and 2 at the end of Chapter 8 (Page 505).