

CS303 (Spring 2008) — Assignment 13

Due: 04/28/2008

- (1) Exercise 8.1-3 from the textbook.
- (2) Exercise 34.5-1 from the textbook.
- (3) Prove that the following problem SET COVER is NP-complete: Given a ground set (or “universe”) U of n elements, and m sets $S_1, S_2, \dots, S_m \subseteq U$, find the smallest collection of these sets covering all of U . That is, find the smallest set $C \subseteq \{1, \dots, m\}$ such that $\bigcup_{i \in C} S_i = U$. First phrase the problem as an equivalent decision problem, and then prove the decision problem NP-complete.
- (4) Prove that the following problem SET PACKING is NP-complete. Given m sets S_1, S_2, \dots, S_m , find as many of these sets as possible such that no selected pair of sets intersects. That is, find the largest set $C \subseteq \{1, \dots, m\}$ such that for all $i, j \in C$, we have $S_i \cap S_j = \emptyset$. First phrase the problem as an equivalent decision problem, and then prove the decision problem NP-complete.