

CPSC 511/611 — Assignment #2

\mathcal{NP} -Completeness

1 About This Assignment

This assignment can be completed by groups of up to two students in CPSC 511; students in CPSC 611 are to complete it individually.

The assignment is due by 11:59 pm on Friday, October 31. A printed copy of answers for written questions should be submitted by each group (for CPSC 511) or student (for CPSC 611) using the drop boxes on the second floor of the Mathematical Sciences building. If you typeset your submission then one student in your group can also submit an electronic copy (as a PDF file) using the assignment dropbox in D2L. However, a printed copy is still required if you do this!

Problems To Be Solved

1. Please complete Problem #7.28 on page 325 of the current (i.e., third) edition of the textbook.

This is also “Problem #7.26” on page 274 of the *first* edition of this textbook. I am therefore guessing that it can be found in the problems in Chapter 7 of the second edition too. The textbook includes useful pictures that are not easily included here.

With that noted, the text for this problem is as follows.

You are given a box and a collection of cards (as indicated in the following picture). Because of the pegs in the box and the notches in the cards, each card will fit in the box in either of two ways. Each card contains two columns of holes, some of which may not be punched out. The puzzle is solved by placing all the cards in the box so as to completely cover the bottom of the box (i.e., every hole position is blocked by at least one card that has no hole there). Let

$$PUZZLE = \{ \langle c_1, c_2, \dots, c_k \rangle \mid \text{each } c_i \text{ represents a card} \\ \text{and this collection of cards has a solution} \}.$$

Show that $PUZZLE$ is \mathcal{NP} -complete.