

CS 512: Design and Analysis of Algorithms

Autumn 2020-2021

Homework # 4

Due Date: 16-11-2020

Total Marks: 10

November 6, 2020

Important

1. Typeset your answers using \LaTeX or Word. Upload a pdf file as your submission.
2. Identical answers by two students on the same problem will incur zero marks for both students for the problem.
3. Copying answers from the Internet will also be penalized by awarding zero marks.
4. A plagiarism checker will be used to detect all types of copying.
5. Include your name and roll number at the top of your answer script.

Prove that both the following problems are NP-complete by showing that each is in NP and by giving a poly-time reduction to it from a known NP-complete problem (either proved in the slides used in the class or in the textbook by Kleinberg and Tardos).

1. Given a graph G and integer k , does G have a cycle, with no repeated nodes, of length at least k ? (10 marks)
2. Given a family of sets $\{S_1, S_2, \dots, S_n\}$ and an integer b is there a set H with b or fewer elements such that H intersects all the sets in the family? (10 marks)