Writing Assignment 1
NP-Complete Problems in Practice

Due: Tuesday, October 3rd

Directions

Find an NP-complete decision problem that is used as a simplified model for a practical problem within an applied area of computer science that interests you. The areas are limited to AI/machine learning, security, networking/distributed-computing, computer graphics, software egineering, data mining, and computer architecture. The problem should be presented within a book or technical article written about your area of interest. Then answer each problem below while following these guidelines.

1. The NP-complete problem you choose must be different from each of the NP-complete problems that appear in the Map Reducibility and Computational Complexity lectures.
2. Your answers may be either handwritten or typed, but if typed, then you must use a word processor that supports any mathematical notation that is needed for your answers. It's NOT ok to use keyboard characters to represent math symbols.
3. For the sake of accuracy, it is OK to copy mathematical and computer-science definitions from a written source so long as you cite the source. You may also include images from a source so long as you provide a citation for them. All other writing must be put into your own words. **Plagiarism is grounds for receiving an F for both the assignment and the entire course.**
4. Upload your answers in one or more PDF files to the WA1 Canvas folder. Only PDF files will be accepted.

Problems

1. Provide a detailed citation of the reference(s) you've used including the pages where the practical problem and the NP-complete problem are defined. Note: no points shall be awarded for this assignment if this part is not completed. (0 pts)

2. In one or more paragraphs, describe the area of computing that you've chosen, as well as the general practical problem in that area for which your chosen NP-complete problem is used as a simplified model. When defining the practical problem, make sure to define all technical terms which may seem unfamiliar to someone outside of that computing area. (7 pts)

3. Provide a formal definition of the NP-complete decision problem. Explain how the NP-complete problem is used to model the practical problem. (8 pts)

4. Provide an example of a positive instance of the NP-complete problem as well as an example of a negative instance. Explain. (10 pts)