

---

## Assignment 6 – Due Thursday, November 20

1. The population of FeudLand consists of people who have sworn “blood feuds” against certain other people from FeudLand — for example, Joe has declared a blood feud against Abe, where if Joe and Abe are ever in the same room they will try to kill each other. The blood feuds are all well-known and publicized, so it’s possible to make a list of all pairs of people who have sworn blood feuds against each other. A mediator would like to gather as large a group of residents as possible from FeudLand for a discussion on how they can make FeudLand a more peaceful place to live, but obviously can’t include two people who are feuding to the meeting. Your job is to see if it’s possible to compute the best (maximum size) invitation list for a peaceful meeting.
  - (a) Formalize notation so that the statement of this problem is precise. You are free to use any standard computer science or mathematical structure that makes this problem clear.
  - (b) Define a language (i.e., decision problem) that captures the computational complexity of the optimization problem described in this problem.
  - (c) Show that this language is NP-complete. (*Hint*: This problem is very closely related, at an abstract level, to one of the NP-complete problems in Chapter 7 — see if you can find what problem this is, and use this problem in your NP-completeness proof.)
  - (d) What does this say about creating the best possible invitation list? Can you do it in a reasonable amount of time?
2. Recall that  $coNP = \{L \mid \bar{L} \in NP\}$ . Prove that  $coNP \subseteq PSPACE$ .
3. Sipser Problem 8.9.
4. Sipser Problem 8.20.