Problem Set 9—Due June 3, 2004

You're in trouble now; I've recently read a book by Neil Postman that argues that curricula, at every level, should be more **question-based***. Postman argues that society needs people who can ask good questions, their own questions, more than it needs people that have learned to generate answers designed to placate some authority figure (e.g., your teacher, me!). Postman also argues that questions should be* **open-ended***, lest they engender a sort of "play-pen" creativity in which you* **think** *you are being creative, but really it is a stupid sort of creativity, where you invent within very narrow strictures.*

Let's see if we can satisfy Neil—you and me both.

You may work with a partner (and I encourage you to). If you do so, turn in a **single** *writeup. Please typeset your answers regardless.*

If you use any outside source (besides the partner above), you must reference it.

As always, your writing should be clear and **succinct***. This is all the more important when trying to address an open-ended problem, where the reader has no idea what to expect from you.*

Grading on this problem set will be (necessarily) subjective.

Problem 1 Make up an interesting language—as interesting as you can—and then prove that it is undecidable.

Problem 2 Perhaps the most natural intuition for a **reduction** is that "one problem reduces to another if an algorithm for one of the two problems implies an algorithm for the other one." Define a rigorous notion along these lines; give a theorem relating the power of your notion to the power of a many-one reduction; and then prove your theorem true.

Problem 3 We've investigated several classes of languages (regular, context free, recursive, r.e.) Choose a class of languages and ask an interesting question about it. Don't answer your question (you can tell me what you do know about it); only ask it.

Your question should be nice and elegant. You suspect that it has a satisfying answer, but you don't know what it might be. You suspect I don't know what it would be, either.