Goals: To explore the problems surrounding programs that play Octi, and research and experiment with different solutions. In the process, to build experience and skill researching computer science questions in general. The final "material" goal of the project is to produce several programs that will play Octi. This final goal spawns many other goals along the way.

A bit about Octi: Octi is a game invented by Yale Professor Donald Green and successfully marketed to the general public. At the beginning of the game, none of the pieces are allowed to move. Each piece has eight sides, and on his or her turn a player may add "prongs" to one of the sides. The piece may then move in that direction. More prongs may be added to create pieces with more specific powers. Pieces may be captured during the course of the game by jumping. The object of the game is to take over certain valuable spaces on the board. More detailed rules can be found online.

Summary of Deliverables:

- Written preliminary report discussing the nature of the problems facing programs that play Octi, the merits of various approaches, and the limitations if any of modern hardware or software. (Also will discuss/summarize existing programs to the extent that their methods are known).

- An Octi program for human-to-human, human-to-computer, and computer-to-computer play, written in C or another language to be discussed with the professor.

- Four different final Octi-playing (read: AI) programs to present, implemented in C or C++, and capable of being loaded into the Octi platform above. Additional programs are welcome but not required and may be provided if they have particular relevance. At least one of the programs must be an attempt to write the "best" (most competitively successful) program given the research done during the project, the skills of the student, and the hardware available.
• For each Octi-playing program, an in depth explanation of the challenges facing the approach and its successes or failures against other types of programs. Discussion of potential of approach for the future given other hardware or software changes.

• A written report presenting data and analysis of the actual empirical success of various approaches, based on test data from the programs implemented. May contain data involving other (or older) versions of programs if useful in demonstrating important patterns in the data.

• A final report that summarizes the work from the rest of the project. The goal is not to repeat work that has been done in the rest of the project, but to provide a top level summary.

Advisor: The advisor for the project will be Professor Dana Angluin. Her role is primarily that of a wise and experienced guide who can help the student find useful resources and give advice about the project in general. Her role does not necessarily include providing specialized knowledge of game-playing programs, although such help is quite welcome.

Notes:

1. As stated earlier, one of the programs must be an attempt at the "best" program possible given the research done and the resources available. The other three or more programs may play slightly different roles. Their role, which does still include being competitive, may also be to demonstrate alternate approaches to solving the problem. They may be used to highlight things learned in the course. In some cases it is possible for one of these programs to do poorly competitively against the other programs, but to succeed in demonstrating a particular type of strategy or approach.

2. Resources that may be consulted are not confined to Yale. The internet, papers, prior public or academic work on the subject, or interviews of professors or players are all fair game. (However, Yale professors are likely to be of great service and should probably be consulted, particularly those that specialize in search algorithms or games.)

3. The interface to the human-to-human, human-to-computer, and computer-to-computer Octi game program may be a keyboard interface. The "graphics" of the program do not need to be stellar-
their role is to accurately and recognizably depict Octi and all of the features of the game.

4. The student will usually meet with the advisor about once a week, although there is some flexibility in this requirement. For example if one or more needs to travel or cannot meet on a certain day, it is not the end of the world. In these cases email communication can go a long way.

5. After a discussion with Professor Angluin in which she asked, why “four” programs, the answer mainly being that four “seemed like a good number,” producing four final programs is now more of an initial target and the final number is flexible downwards or upwards.