PROBLEM SET 7 (HALLOWEEN SPECIAL)
DUE FRIDAY, NOVEMBER 3

(1) (50 points) A group of ten pirates wants to diviede a treasure of 100 gold coins. Their decision making process goes as follows: The most ferocious pirate proposes a way to divide up the coins. Then all the pirates, including him, vote on his proposal. If at least half of the pirates vote in favor of it, the coins will get divided in the way he suggests. Otherwise, he will be tossed over board, and the second most ferocious pirate gets to make the next proposal, and so on. Every pirate is greedy and tries to maximize his profit. However, if it would not make any difference to him financially, he will vote against the proposal, just to see someone thrown over board. Everybody knows his and the other pirates ranks in terms of ferociousness. What will happen?

(2) (50 points) A group of very hungry, yet honest monsters has cornered a group of one hundred 347 students. They explain to the students, that they will play a game with them: The students will have to stand in a line, one behind the other, and the monsters will put a hat on everybody's head. The hats come in three different colors - blood-red, vomit-green and Barbie-pink. Each student will have to guess the color of his own hat. He (she) can only see the hats of the people in front of him (her), but can clearly hear what everybody says. The monsters will ask the students in order, starting from the last one, then the second to last, and so on. They politely announce that the number of wrong answers they hear will be equal to the number of 347 students whom the will eat for dinner.

While the monsters go to fetch the hats, the students have a few minutes to agree on a strategy that minimizes the number of fatalities. How many students will they have to sacrifice? What is the strategy? Why does it work?

Date: October 27, 2006.