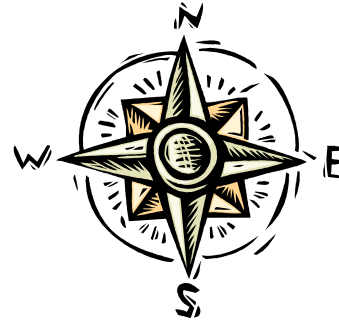


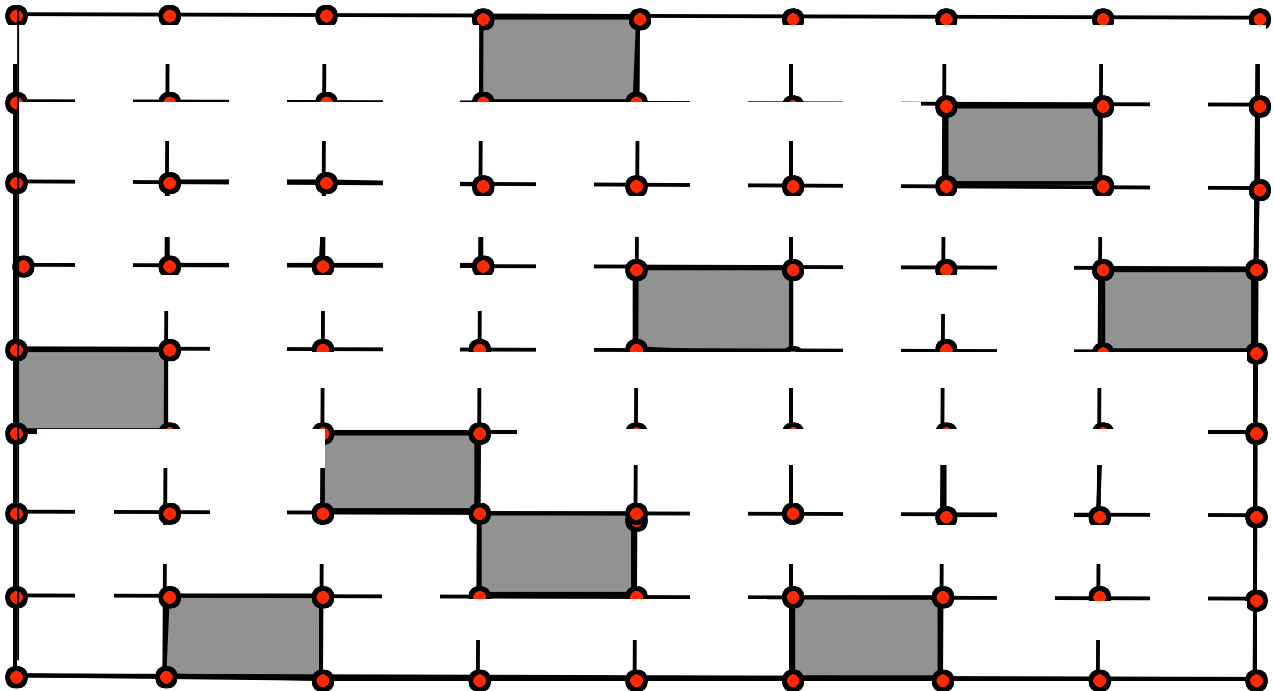
LOST IN A CORN MAZE!!!!

You and your friend find yourselves in an interesting corn field. In the field have been cut pathways, but in many cases (the brown regions) the corn has grown thick to prevent anyone from passing or seeing through. You decide to play a game. One of you will start in the upper left corner and the other in the lower right. You each have a deck of cards, a spinner, a calculator or some random device. For each turn, each of you will randomly choose a direction.

Explain how you will use your device to represent the different directions _____



If you are unable to move, you may choose again until you are able to move. **The turn does not end until each of you have moved** The game is over when you and your friend can see each other directly down a column or across a row.



Use simulations to estimate the average number of turns until the game ends. Play the game with a partner several times and each time, record how many turns the game lasts. Combine your results with those of your classmates. **What is the average number of turns, according to your simulations???**

Now, let's try the simulation using a computer. Go to <http://www.mbhs.edu/~steind00/> click on "Cornmaze Applet" and then click on "applet"

You should see a blank field. We want to create a corn maze that looks exactly like the one we used in our "by-hand" simulation.

- 1) Set the correct size. In our example we had 8 rows and 8 columns.
- 2) Set the P(blockade) to 0
- 3) Click on Make New Maze
- 4) By clicking on the rectangles, put in the blockades exactly as they are in our example maze.

You should have a field that looks just like the one on the reverse side of this paper.

Click on "Run Simulation". You should see the computer run one simulation of our game and stop when the two friends see each other. If it is moving too fast for you to watch you can slow the speed down using the drop down menu.

The real reason we want to use a computer is so we can do lots of simulations quickly. Change number of trials to something large, like 1000. Hit run simulation and change the speed to Warp 10. Watch the computer go through 1000 games very, very quickly.

1) After 1000 games, what was your average length? _____ Compare this to your classmates results. What can we conclude? _____

2) Is this result consistent with that of our "by-hand" simulation? Can you explain any discrepancies? _____

3) The computer also made a histogram of your results. What is the shape of this histogram? _____ How can you explain this? _____

4) Now lets have some fun. Make any size maze you want and put the blockades any place you wish. If you would like, you can start by having the computer randomly put in blockades, and then change them as you see fit. Do this by changing $P(\text{blockade})$ to some number between 0 and 1. Make sure maze is possible, i.e., there must be at least one way for the friends to see each other. Run your simulation many times. Can you make a maze that takes a REAL long time to complete?

5) CONTEST TIME!!!!!! Which one of you can make a 15 x 15 maze for which the average number of moves is the largest. To enter, you have to run it at least 100 times and take a screen shot of your result to send to me. Have fun!!!!