Homework Assignment Two
Chaos and Complex Systems

Due Friday September 22, 2006.

Note: Please be sure to include a list of the references you consulted and any students you worked with.

1. You have 30 fish in 30 tanks. You want to test and see if the fish, if put together, will fight with each other or get along harmoniously. To do so, you want to put a pair of fish in a special tank and monitor them for a day. Your colleague wants to pair up the 30 fish in each possible way. How many days will it take to complete this experiment?

2. Suppose you have a random network with $N = 1000$ and $p = 0.02$. What is the probability that a node has degree 3? What is the probability that a degree 0?

3. After an in vitro fertilization procedure (IVF) four fertilized eggs are placed in the mother's uterus. Assume that each egg has one chance in ten of implanting successfully, and that this is independent of whether any of the others implants. What is the probability that none of the eggs will implant? That a single egg will implant? That there will be twins? That there will be triplets? That there will be quadruplets? That there will be qunitrupulets? (From `http://www.math.lsa.umich.edu/~hochster/425/ec2.html`.)

4. This week you should spend a significant amount of time—at least 2 to 3 hours—doing exploratory reading and thinking and research on your final project. Write a paragraph or two updating me on where you are in this process. (Send this to me via email if you can. However, if this is inconvenient, it's fine to give me this information via paper.)