**COGSCI 131 – Assignment 3**
**DUE: July 15 at class start**

In this problem set, we are going to implement an analysis along the lines of Shepard's Universal Law of Generalization. Imagine that you have one-dimensional stimuli. You should first construct a set of 10,000 consequential regions by randomly selecting a left edge in [-10,0] and a right edge in [0,10] so that all of your regions contain x=0. It will be easiest if you store these consequential regions in a list [ (start1,end1), (start2,end2), … ]. As in class, assume that all of your consequential regions are equally likely.

1. [10pts] What is the probability that x=1 is in the concept (e.g. in any consequential region) given that x=0 is?

2. [20pts] Plot the probability that x is in a consequential region as a function x. What does this function look like? Write a sentence explaining why intuitively.

3. [5pts] One way to check if the curve has an exponential decrease is to plot a logarithmic y axis and look for a straight line. Why does this check if the curve is exponential?

4. [10pts] Plot a logarithmic y axis for x ranging from -5 to 5, and x ranging from -10 to 10. What do these two plots show? How do you interpret them? Explain in a few sentences.

5. [10pts] In previous questions, we've been assuming that people implement the law perfectly and we have been trying to approximate their behavior using 10,000 regions. However, people themselves have limited resources. What if people themselves only used a few consequential regions in order to compute generalizations? Re-plot Question 2 using only 10, 100, and 1000 consequential regions. What patterns do you see?

6. [10pts] Describe a way you could test how many consequential regions people actually made use of in this kind of generalization. Could you tell the difference between 10 and 10,000? Could you tell the difference between 10,000 and 20,000, why or why not?