Psych 254
Exercise 8 (due Dec 5)

In this exercise you will simulate a staircase method for estimating the threshold in a psychophysical experiment. In the experiment, the subject performs a yes/no motion detection task with moving dots. The stimulus parameter being manipulated is the proportion of dots moving in a specific direction (the remaining dots move in a random direction). You will simulate an experiment lasting 1000 trials. The goal is to determine the threshold at which the pseudo-subject is 75% correct using an adaptive staircase method.

The psychometric function relating motion coherence is a Weibull function, with parameters a = e^{-1} (computed in MATLAB as exp(-1)) and b=2. The likelihood of a correct judgment on any trial is determined by a combination of the information available from the stimulus as well as the likelihood of correctly guessing:

```
weibull_p=wblcdf(stimulus_parameter,A,B);
p_correct=weibull_p + guessing_rate*(1-weibull_p);
```

where stimulus_parameter is the proportion of coherently moving dots (ranging from 0-1), A=exp(-1), B=2, and guessing_rate=0.5 (given that this is a 2-choice task). Given this, performance on each individual trial is determined by samping from a uniform random distribution using rand().

In order to find the threshold, you must change the stimulus parameter on each trial. Starting at 0.5, you should reduce the stimulus parameter by 0.01 whenever the subject is correct, and increase the parameter by 0.03 whenever the subject is incorrect (a "one down-three up" rule).

Run 1000 trials, saving the stimulus parameter on each trial, then plot these stimulus parameters across trials (the "staircase"). Then, plot the weibull function wblcdf across the entire range of possible motion levels (0:0.01:1) with the same parameters A and B. On top of this, plot the threshold value (obtained by averaging the stimulus parameter across all trials) on top of the psychophysical function, as shown below.