

## PHY 250L – Spring 2018

### Computing tutorial 9

Welcome to the final week of our PHY 250L computing tutorial. There is no new programming material for this week – rather, you’ll deploy the skills that you’ve developed to investigate a problem related to probability/statistics.

#### Problems for 5.14.2018

The following problem should be completed in either MATLAB or python and uploaded to Sakai by 5.15.2018. The problem should correspond to its own program and possibly separate function definition files. The preferred names for the file is indicated in each problem.

##### 1. monty, 50 points

The Monte-Hall problem is a surprising result from probability theory. For an excellent description, see [\[this video\]](#).

Your job is to design and implement an experiment (program) that tests the prediction that switching is the best strategy for a three-door choice. Your experiment should produce *at least*  $10^5$  trials of the game. You should compare the probability of success for three different agents:

- an agent whose policy is to *always* stay with her first choice (lawful good)
- an agent whose policy is to *always* switch from her first choice once the first (lawful evil)
- an agent whose policy is to randomly choose whether to stick or switch each time with equal probability (chaotic neutral)

It is very important to keep in mind what Monty knows when he reveals one of the Zonk doors! Your agents have policies, but Monty does, too – you’ll need to take this into consideration in order to correctly simulate the situation.

Your program should produce some well-formatted output that describes the results of your experiment.

You are free to work with a partner, but make sure that you each upload the program, and that you include both students’ names in a comment at the top of the code.



Figure 1: You’ve been zonked.