

LARSON—MATH 353—HOMEWORK WORKSHEET 02
The Monty Hall Paradox.

1. Log in to CoCalc.
 - (a) Start the Chrome browser.
 - (b) Go to `https://cocalc.com`
 - (c) Login (**your VCU email address** is probably your username).
 - (d) You should see an existing Project for our class. Click on that.
 - (e) Click “New”, then “Worksheets”, then call it **h02**.
 - (f) **Annotate your work carefully and completely. In particular, write problem numbers, and explanations.**

A problem to think about: the Monty Hall Paradox. There are 3 doors to choose from (on say a game show): Doors 0, 1 or 2. There is a car behind one door and a goat behind each of the other two. You choose one door (say, Door 2). Maybe it has the car behind it (or maybe not)? At least one of the other doors has a goat behind it—and one of these doors is opened (say, Door 1). You are then given an opportunity to switch your choice of door (in this example, you could switch from Door 1 to Door 0). Should you?

How can you investigate this question experimentally? In class we investigated the case first where Door 0 was chosen. Then we investigated the case where Door 1 is chosen. **Here we investigate the case where Door 2 is initially chosen, and we switch our choice to the remaining door after the goat-door is revealed.**

The motivation of this assignment:

- (a) To **explain** what we did on the Monty Hall Problem, and
 - (b) To copy-and-paste code from what we’ve done successfully—and modify it slightly. (This means you need to either already understand what we did—or ask questions to make sure you **do** understand.)
2. Write code to run this experiment *once*.
 3. *Explain* what the code does in performing this *simulation* (its a simulation as there are no actual doors, cars, goats, etc. We are assuming that we are modeling the essential features of the real-world situation. How?)
 4. Perform this experiment multiple times: run this code in a loop 1000 times. Keep a counter to keep track of how many times you win the car. Then compute the percentage of times you won the car.
 5. Report your results in sentences, in the next cell after you run these experiments.
 6. Repeat the last two steps with 10,000 experiments.
 7. Provide your best mathematical explanation of why switching doors *doubles* your chance of winning the car.

Getting your homework recorded (over)

Getting your homework recorded

When you are done, before you leave class...

- (a) Click the “Make pdf” (Adobe symbol) icon and make a pdf of this worksheet. (If Cocalc hangs, click the printer icon, then “Open”, then print or make a pdf using your browser).
- (b) Send me an email with an informative header like “Math 353—h02 worksheet attached” (so that it will be properly recorded).
- (c) Remember to attach your homework worksheet!