

Monty Hall, Three Doors - Exploration Questions

Computational Modeling and Simulation

CS 1025 assignment #1 – due on Friday, 09/06/2013

Email answers to: jacobson@cs.uni.edu

with SUBJECT: Monty Hall

The game simulates a well-known game show situation that used to happen on the Monty Hall game show. A player is given the choice of three doors. Behind one door is the Grand Prize (a car and a cruise); behind the other two doors, booby prizes (pigs). The player picks a door, and the host peeks behind the doors and opens one of the rest of the doors. There is a booby prize behind the open door. The host offers the player either to stay with the door that was chosen at the beginning, or to switch to the remaining closed door.

1. Try to predict what the better strategy is: to switch doors or to stay with the original choice. Predict what you think will be the best approach, or if you think that it makes no difference.
2. State what you think are the chances of winning in either case? For example, if we were talking about flipping a coin, you would say the chances are 50 % for getting heads and 50 % for getting tails. Or 1 chance out of 2 for Heads and 1 chance out of 2 for getting tails. This is just an educated guess on your part.
3. Play the game many times and see if the experiment confirms your prediction in #1 and #2 above. Play the game at least 25 times using each strategy. Record and report your results.
4. Discuss which strategy appears to be better as the result of your experiment: Always staying with your 1st choice, or always switching to the other door; or if it appears not to make any difference at all.

The following questions require you to watch the Khan Academy YouTube video on **Probability (part 1)**: <http://www.youtube.com/watch?v=3ER8OkqBdpE>

5. What is the FREQUENCY or “frequentist definition” of probability? Khan explains this from about 2:55 to 3:35 in the video tutorial.
6. From 5:00 to 5:10 in the video, Khan gives a notation for $P(a)$ or $\text{Prob}(a)$ and then defines it informally as a fraction with a numerator and a denominator. Given your recorded experimental results from #3 above, express the $P(\text{winning with stay})$. Then express the $P(\text{winning with switch doors})$ notation.

Note: the Khan Probability (part 1) video is length 10:30. You only need to watch it until 5:10 or so for doing this assignment.