

The Monty Hall Problem

An Illustrative Excel Worksheet

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1. Monty Hall offers you a choice of three doors. Behind two are goats, and behind one is a brand new car. After you make the choice, he opens one of the doors you didn't choose to reveal a goat, and offers you the chance to switch your choice to the one remaining. Should you switch?
2. Before Monty opened a door, you have a $1/3$ probability of choosing the correct door. However, once Monty opens one of the doors you didn't choose and reveals a goat, you have more information than you did before. With more information, you should be able to make a more informed choice and improve your odds of winning.
3. One can show¹ that if you switch, your probability of winning is $2/3$.
4. We can apply a Monte Carlo procedure to estimate the probability of winning. See the Excel file `mathe304_montyhall.xls` for an implementation of such a procedure. To generate new random numbers in the Excel file, click on any blank cell, press space, and then press enter.

¹See Charles Grinstead and J. Laurie Snell, *Introduction to Probability*, second revised edition, American Mathematical Society, 1997, also available online at <http://www.dartmouth.edu/~chance/book.pdf>.