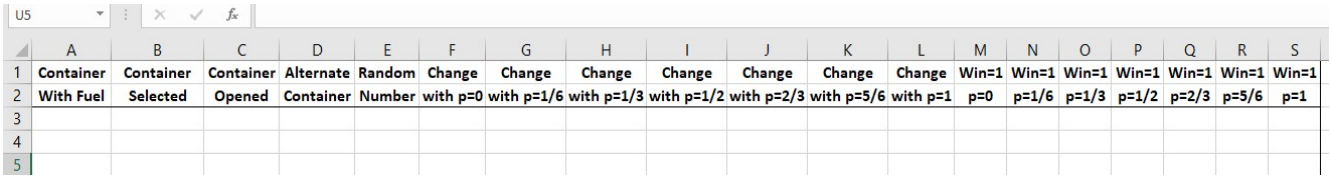
The Citee Gamers Excel Program Extension for the Monty Hall Problem Simulation

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These guidelines extend the original program in Excel for simulating the Monty Hall problem found in:

> Muller, E., Buteau, C., Monaghan, M., & Rocci, E. (year). *The citee gamers*. *Ontario Mathematics Gazette*, *58*(2), 34–38.

For this application, the Citee Gamers needed to introduce more columns, which they labelled as follows:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Container	Container	Container	Alternate	Random	Change	Change	Change	Change	Change	Change	Change	Win=1	Win=1	Win=1	Win=1	Win=1	Win=1	Win=1
2	With Fuel	Selected	Opened	Container	Number	with p=0	with p=1/6	with p=1/3	with p=1/2	with p=2/3	with p=5/6	with p=1	p=0	p=1/6	p=1/3	p=1/2	p=2/3	p=5/6	p=1
3																			
4																			
5																			

1. They repeat steps 1–4 from original in the Appendix.

2. *They chose a random number used to determine whether the pilot changes his container selection:*
   Click on cell E3 and type: =RAND()
   (This selects a random number between 0 and 1.)

3. *Now the pilot will finalize his container selection based on the probabilities. If the probability of changing his selection is less than the random number generated in column* E*, he will change his original selection. If it is greater than the random number, then he will not change containers.* Click on cell F3 and type: =B3
   (This is because the probability of the pilot changing his answer is 0, so his container selection does not change.)
   Click on cell G3 and type: =IF(E3<0.167,D3,B3)
   Click on cell H3 and type: =IF(E3<0.333,D3,B3)
   Click on cell I3 and type: =IF(E3<0.5,D3,B3)
   Click on cell J3 and type: =IF(E3<0.667,D3,B3)
   Click on cell K3 and type: =IF(E3<0.833,D3,B3)
   Click on cell L3 and type: =D3
   (The latter is because the probability of the pilot changing his answer is 1, so his container selection will always change.)
4. *The Citee Gamers used 1 to represent a win, and 0 to represent a loss.*

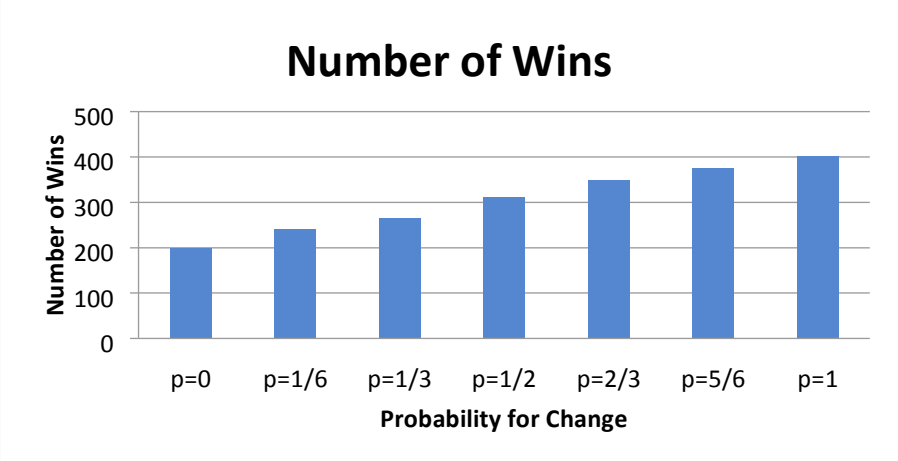
Click on cell M3 and type: =IF(F3=A3,1,0)
Click on cell N3 and type: =IF(G3=A3,1,0)
Click on cell O3 and type: =IF(H3=A3,1,0)
Click on cell P3 and type: =IF(I3=A3,1,0)
Click on cell Q3 and type: =IF(J3=A3,1,0)
Click on cell R3 and type: =IF(K3=A3,1,0)
Click on cell S3 and type: =IF(L3=A3,1,0)
(Column M *will indicate whether the pilot wins or loses if he does not change his container selection. Column* N *will indicate whether the pilot wins or loses, if he changes his selection 16.67 percent of the time, and so on.)*

5. The Citee Gamers now repeated this 600 times, by applying the code to other rows by selecting cells A3 to S3, then clicking and dragging the black square in the bottom right corner of cell S3 down to row 602 (just like in the Appendix).
6. The coding above resulted in something like the following table, but not exactly the same because of the randomization.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Container	Container	Container	Alternate	Random	Change	Change	Change	Change	Change	Change	Change	Win=1	Win=1	Win=1	Win=1	Win=1	Win=1	Win=1
2	With Fuel	Selected	Opened	Container	Number	with p=0	with p=1/6	with p=1/3	with p=1/2	with p=2/3	with p=5/6	with p=1	p=0	p=1/6	p=1/3	p=1/2	p=2/3	p=5/6	p=1
3	1	2	3	1	0.3204	2	2	1	1	1	1	1	0	0	1	1	1	1	1
4	1	1	3	2	0.9141	1	1	1	1	1	1	2	1	1	1	1	1	1	0
5	1	2	3	1	0.4954	2	2	2	1	1	1	1	0	0	0	1	1	1	1
6	1	2	3	1	0.3079	2	2	1	1	1	1	1	0	0	1	1	1	1	1
7	3	3	1	2	0.8308	3	3	3	3	3	2	2	1	1	1	1	1	0	0
8	1	3	2	1	0.791	3	3	3	3	3	1	1	0	0	0	0	0	1	1
9	3	2	1	3	0.7847	2	2	2	2	2	3	3	0	0	0	0	0	1	1
10	3	2	1	3	0.6177	2	2	2	2	3	3	3	0	0	0	0	1	1	1
11	1	2	3	1	0.9093	2	2	2	2	2	2	1	0	0	0	0	0	0	1
12	2	1	3	2	0.9648	1	1	1	1	1	1	2	0	0	0	0	0	0	1
13	3	2	1	3	0.6604	2	2	2	2	3	3	3	0	0	0	0	1	1	1
14	1	1	3	2	0.38	1	1	1	2	2	2	2	1	1	1	0	0	0	0
15	3	1	2	3	0.0695	1	3	3	3	3	3	3	0	1	1	1	1	1	1
16	2	2	1	3	0.1871	2	2	3	3	3	3	3	1	1	0	0	0	0	0
17	1	3	2	1	0.6593	3	3	3	3	1	1	1	0	0	0	0	1	1	1
18	3	2	1	3	0.7257	2	2	2	2	2	3	3	0	0	0	0	0	1	1
19	3	3	1	2	0.9467	3	3	3	3	3	3	2	1	1	1	1	1	1	0
20	3	2	1	3	0.0255	2	3	3	3	3	3	3	0	1	1	1	1	1	1
21	2	3	1	2	0.9915	3	3	3	3	3	3	2	0	0	0	0	0	0	1
22	3	2	1	3	0.86	2	2	2	2	2	2	3	0	0	0	0	0	0	1
23	3	1	2	3	0.1013	1	3	3	3	3	3	3	0	1	1	1	1	1	1
24	1	3	2	1	0.3277	3	3	1	1	1	1	1	0	0	1	1	1	1	1
25	1	2	3	1	0.1299	2	1	1	1	1	1	1	0	1	1	1	1	1	1

Program | Graph | Sheet3

From programming the first time, the Citee Gamers now got the computer to sum the number of wins in columns M to S, and programmed the plot of the results and obtained the following graph:


Number of Wins
Number of Wins
500
400
300
200
100
0
p=0
p=1/6
p=1/3
p=1/2
p=2/3
p=5/6
p=1
Probability for Change