Assignment 3: Write-up, discussion and results

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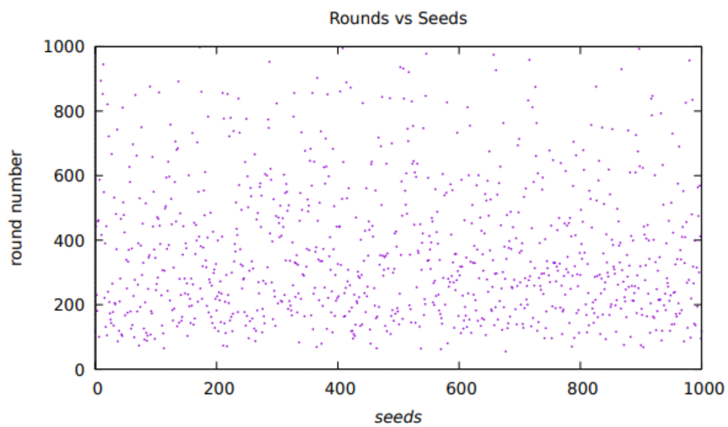
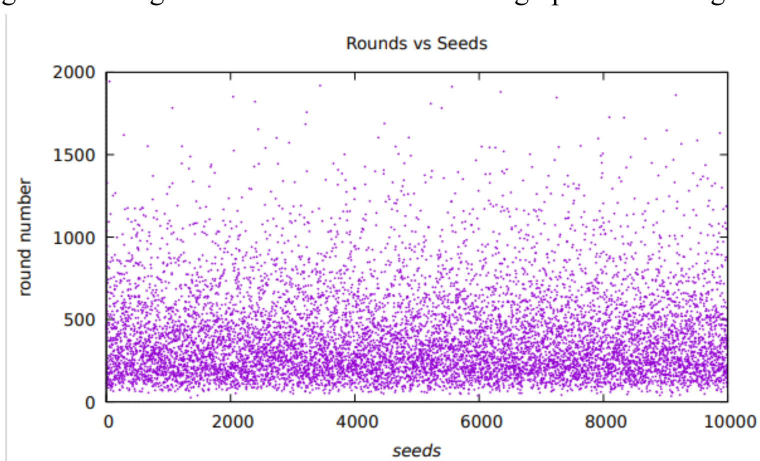
In this test students were told to investigate what the mean round number is in a game of six players, each player starting with four coins. To do this, I ran a simulation plotting a game's round number against its seed for one thousand different seeds. The mean round number was about 398 as shown below. Next I decided to go up an order of magnitude to find out how accurate this average was.



min: 55 rounds
max: 1945 rounds
mean: 398.0920 rounds

It turned out that the percent difference between both means was a mere 0.776%. Which is to say that one thousand simulations is sufficiently accurate, in most cases, to predict the average round number for the given initial game environment. Below is a graph showcasing ten thousand seed simulations.

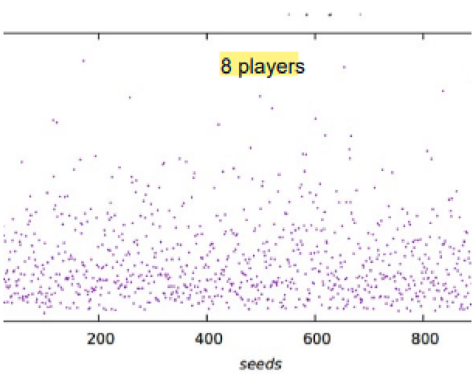


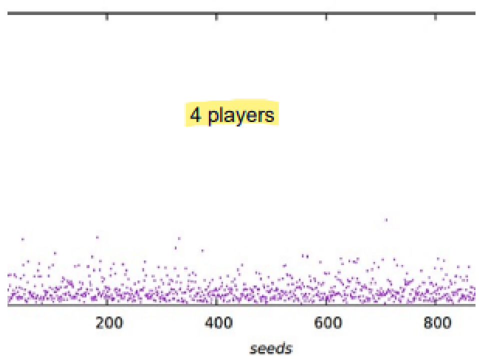
min: 26 rounds
max: 2539 rounds
mean: 401.2052 rounds

Investigating round variety due to differences in the number of starting players:

From the previous findings, since the average round number for one thousand simulations and ten thousand simulations barely differ (only by .776%), I think it is appropriate to use one thousand different seeds to calculate this test.

In this environment, there was a starting coin number of three. After testing each different player number I found that the number of players significantly impacts the variety of rounds.

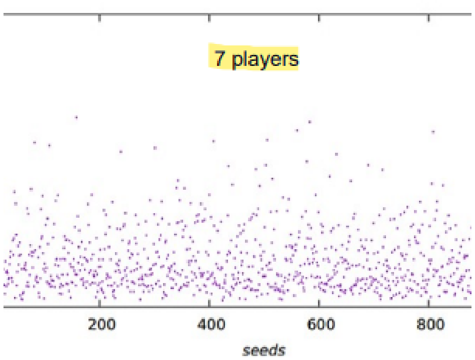


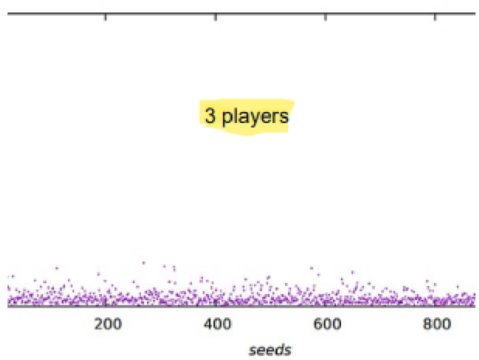


MAP

x axis: seed

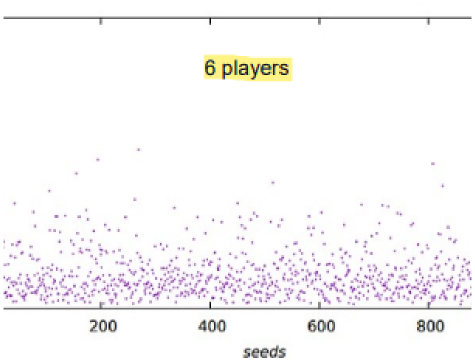
y axis: rounds

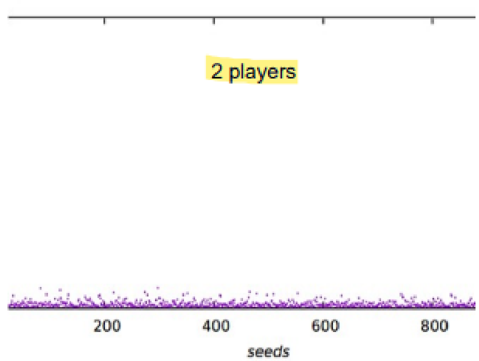


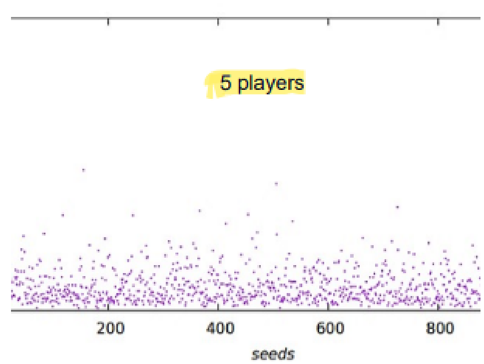


Conclusion:

more players --> more round variety







…………….	std dev
2 players	27.6130
3 players	40.9947
4 players	103.6280
5 players	115.0481
6 players	163.5683
7 players	211.9540
8 players	274.3606

As pictured here, in the table to the left, the standard deviation grew with each added player, increasing the variety of rounds.

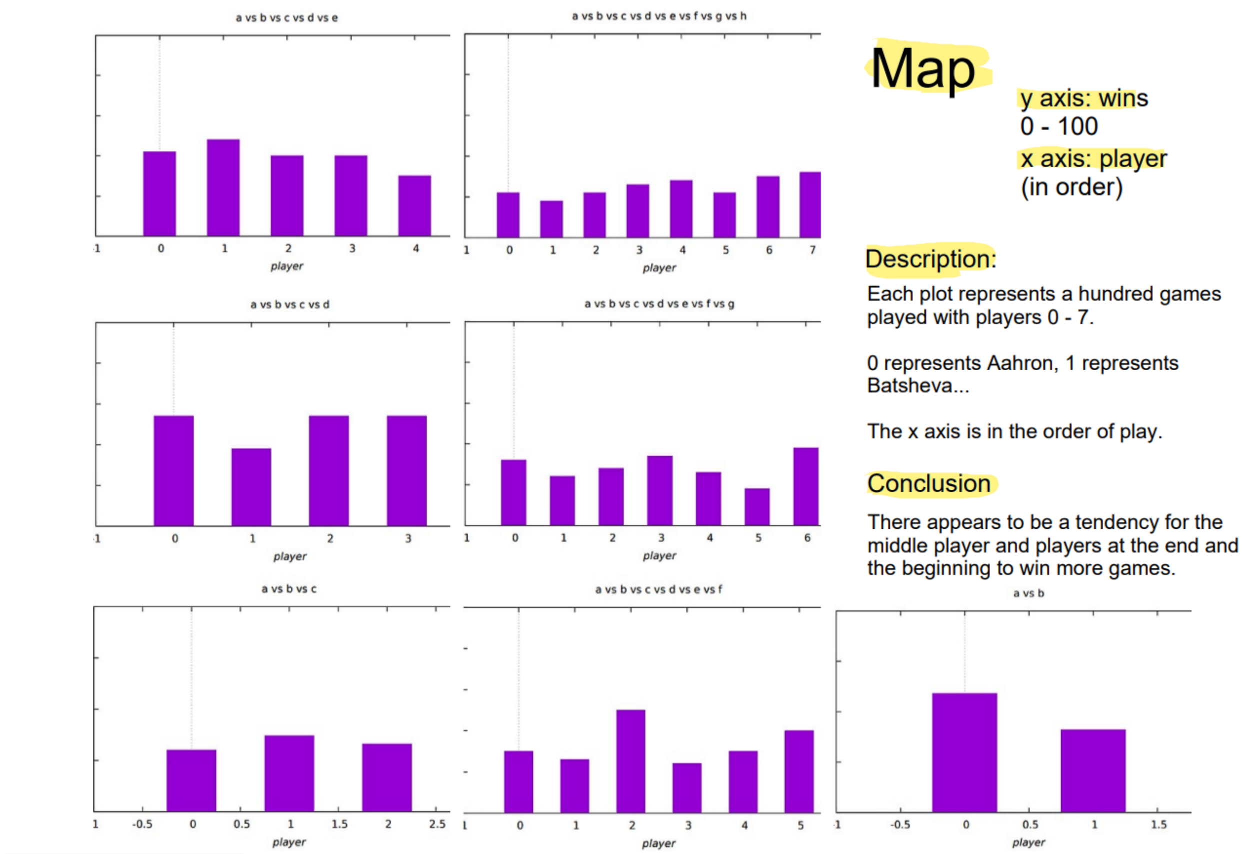
Player order significance:

To test whether the position of a certain player relative to the total players in the game held any significance. I decided to plot **players in playing order on the x axis** against **their own wins** on the y axis for a simulation of one hundred games.

Before I begin with the results, I want to note that one hundred simulations will probably result in a larger percent difference in results from a *truly random* simulation. But since the pattern is apparent from graphs, *abcdef* to *abcdefgh,* I believe my plots have illustrated some kind of notable, regular behavior.

Since the behavior of the *spin_dreidel()* function is presumed to be random, we can deduce that the regular behavior favoring middle and outside players to win more often is indeed a result of relative position in the order. Also due to the randomness, The regular behavior of this graph could be illustrating some kind of double or triple bell curve present in the nature of the game.

The results are displayed on the page below.



Conclusion:

In conclusion, Dreidel is a game of randomness, but predictable randomness. Similar to how beads trickling down a Galton Board, by chance, fall more often in the middle. Players at the exact beginning, middle, and end of the order of a Dreidel game will experience victory more often.