The Probability in Dice: Analysis of 100 Dice Rolls

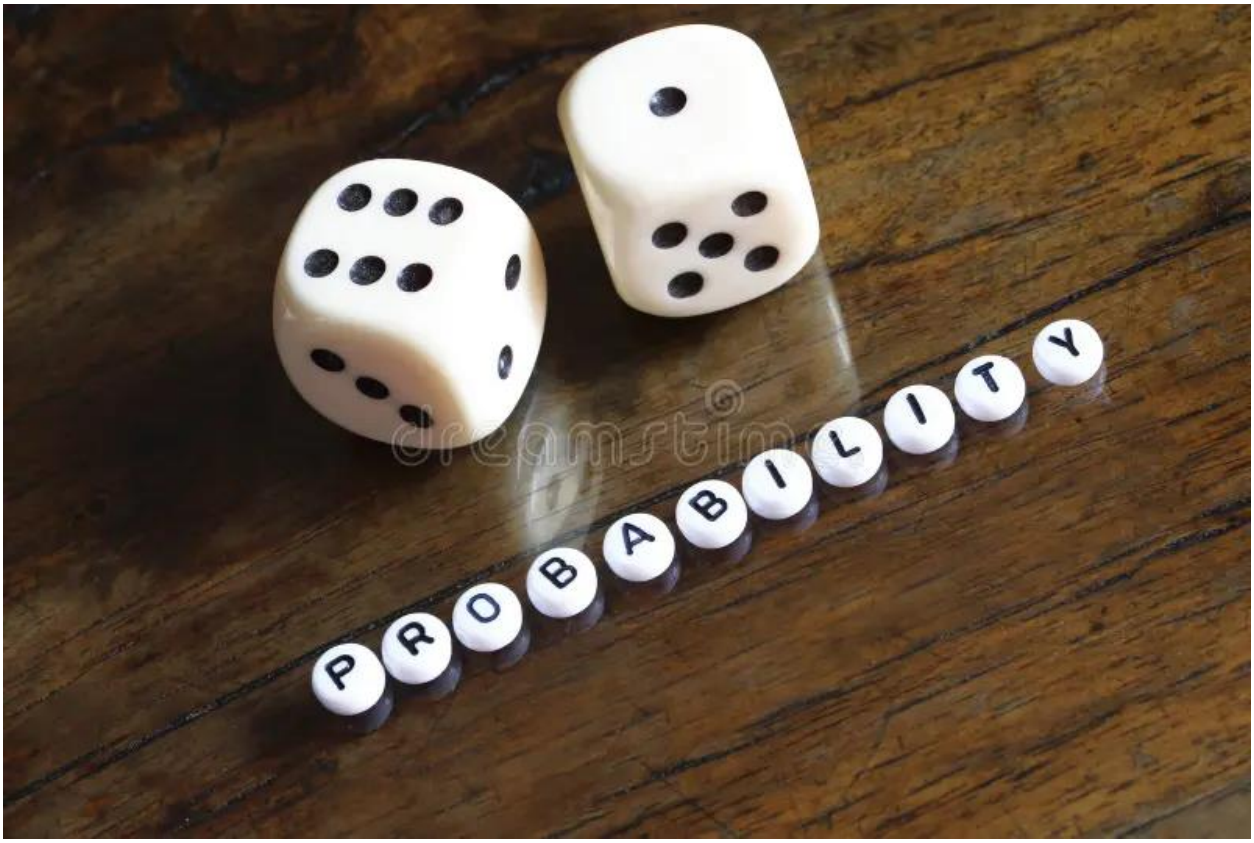

Figure 1. A pair of dice showing the probability of 7

Abstract

The goal of this experiment was to find the probability of 2 dices by rolling them 100 times. The frequencies of all the sums are recorded and then compared to their expected frequencies using the theoretical probability. In general, there was a good agreement between experimental and theoretical trends, as the most frequent roll (7) had occurred much more frequently than any of the other rolls.

Introduction

“Life is like some rolling dice, so watch who you are rolling with and choose your friends carefully while keeping my enemies close", my granddad always told me. We use toy dice in many different fashions such as gambling, educational purposes or playing board games. In other words, in this case we will be performing and producing an interesting lab to test the probability theory of a dice. We will first be rolling out a two six-sided dice by a computer dice website

which will produce sums ranging from 2 to 12, each with different probabilities based on the number of possible combinations. For example, 7 is the most likely outcome because it can be formed in six different ways (1+6, 2+5, 3+4, 4+3, 5+2, 6+1). The purpose of this experiment was to determine whether experimental results from 100 trials would match the theoretical probability distribution. My hypothesis is, if two dice are rolled 100 times, then the distribution of sums will resemble the theoretical distribution which would be 7.

Materials and Methods

Materials:

- Two six-sided dice that was rolled on the website calculator.net https://www.calculator.net/dice-roller.html

Figure 2. A picture showing the dices used in the experiment

- Paper to write your results
- Pencil or pen
- Used Excel to put data in table

Methods:

1. Two dices were rolled together 100 times.
2. The sum of each roll was recorded.
3. Frequencies of sums (2–12) were summed up.
4. A bar graph to show the results.

Results of Rolling Dice

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	3	5	9	11	13	19	12	10	8	6	4

Figure 3: Distribution of Dice Sums

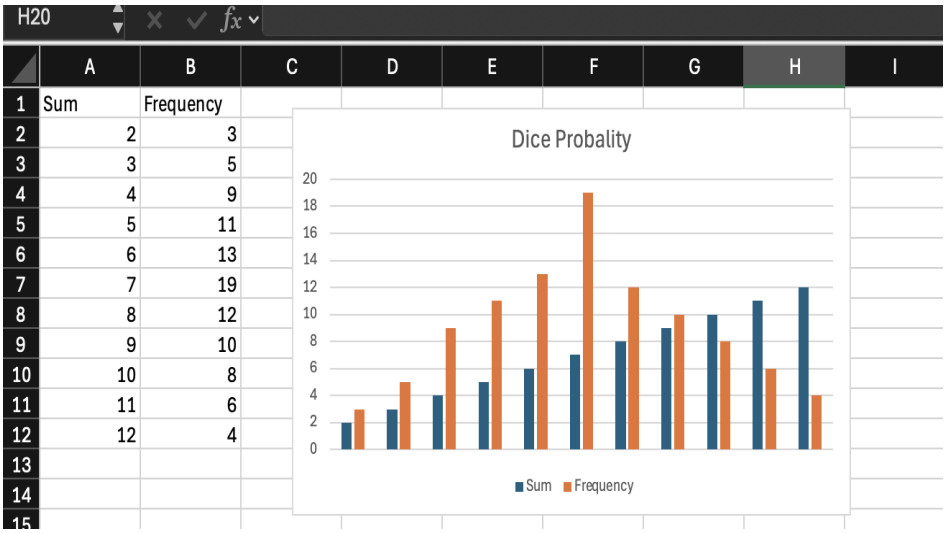

Figure 4: Bar graph from Microsoft Excel showing observed frequencies of dice sums over 100 trials. Blue representing the sum while orange bar representing the frequency.

Analysis

The hypothesis for this experiment was that number 7 would have the higher chance of showing up more frequently, which was proven to be correct. This can be seen from the multiple figures that I have shown above, such as figure 3 and 4. Figure 3 shows the result of the dices, such as the sum and frequency, while figure 4 shows a bar graph of that result. The results from my lab generally followed the expected theoretical distribution of the dice, with 7 appearing most frequently and 2 and 12 appearing least frequently.

My lab report closely aligned to those proposed by Peter K. Dunn, a statistician and author of "We Can Still Learn About Probability by Rolling Dice and Tossing Coins". He states that rolling dice is a good method for learning about probability due to randomness of each roll and if we repeat the process multiple, we will have a consistent pattern. I also witnessed this during my Lab. I hypothesized that number seven would appear because of most of the rolls and my results confirmed my hypothesis. Theoretical results from Dunn (2005) show that there are six combinations that allow for a sum of 7 using two dice which make 7 the greatest possibility of occurring. Based on my research, the frequency of the dice in my results, displayed in Figures 3-4, 7 appeared most frequently while 2 and 12 appeared the least. These results correlate with the theoretical distribution provided by Dunn in his article.

Conclusion

"Life is like some dice so watch who you are rolling with", my granddad always told me. In conclusion, this lab report explores the probability of rolling a pair of dice and confirmed my hypotheses that the number 7 would appear more frequently rolling the dice 100 times. To

further improve this data such as future research I could try to roll the dice more times, such as 300 times or even trying to understand the probability of gambling. I learned about the probability of dice rolling and how to formulate a hypothesis.

References

Dunn, P. K. (2005). We can still learn about probability by rolling dice and tossing coins. Teaching Statistics, 27(2), 37–41.

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