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Dice experiment:
Number of Total Roll: 360
•   Number of 6 that came up: 66/360

Dice Numbers	1	2	3	4	5	6	average Average
Number of came up	49	63	58	64	60	66	60
Share in the total roll	14%	18%	16%	18%	17%	18%	17%

In our experiment, we rolled a six-sided dice 360 times and recorded the frequency of each outcome. For a fair die, the expected number of occurrences for each face is 60. The observed frequencies ranged between 49 and 66, with the largest deviation occurring for the face "1," which appeared only 49 times. To formally test fairness, we applied a chi-square goodness-of-fit test. The test statistic was calculated as 3.11 with five degrees of freedom. Since this value falls well below the critical threshold of 11.07 at the 5% significance level, we cannot reject the null hypothesis that the die is fair. Thus, despite minor variations in frequencies, the die's outcomes are consistent with randomness and fairness.

Something Interesting:

An interesting feature of this experiment lies in the apparent imbalance in the short run, particularly the lower occurrence of the face "1." While such results may suggest bias to the casual observer, statistical analysis reveals that these deviations fall within the expected range of random variation. This illustrates a key principle in probability and econometrics: the law of large numbers ensures that, as the number of trials increases, the observed distribution converges toward the theoretical probability.

Aqeels spotify playlist: consists of 21 songs (n = 21)

Null Hypothesis: The Spotify playlist shuffle has a uniform randomness not affected by the first initial song chosen, recent activity, or the time you take to listen to each shuffled song. In other words, every song has a 1 out of n chance of being selected.

Alternative Hypothesis: Spotify playlist shuffle is not uniformly random and is affected by the first initial song, recent activity, and the time listened to each song. In other words every song ≠ 1/n chance

Playlist consists of genres:
Hip-Hop: 3
R&B: 3
Rap: 3
Classical: 3
Indie: 3
Pop: 3
Electronic: 3

In order for this experiment to be fair. I would need to take into account the genre of the first song as well as how frequently it shows up compared to others. I added 3 songs for each genre.

For minimum accuracy we will shuffle it 5n times (5 times for 21 shuffles) for a minimum accuracy and to prevent a skewed analysis.

For my experiment I will assess a value to each genre. Keep in mind there are no repeating artists.

Hip-Hop: 1
R&B: 2
Rap: 3
Classical: 4
Indie: 5
Pop: 6
Electronic: 7

Shuffle #1
6 2 7 7 3 1 4 7 6 1 7 2 5 4 3 5 1 6 3 2 4
Shuffle #2
7 2 1 7 3 4 5 2 4 7 3 2 1 1 6 5 6 4 3 5 6
Shuffle #3
7 2 6 7 4 7 4 5 3 5 6 1 1 6 3 4 2 5 3 1 2
Shuffle #4
6 7 1 7 6 3 1 4 7 5 3 4 2 3 2 4 1 2 6 5 5
Shuffle #5
3 7 7 6 5 4 7 5 2 6 5 2 4 3 6 1 3 2 1 1 4
Shuffle # 6
1 2 4 5 2 7 3 5 6 3 6 1 2 1 7 6 7 4 4 3 5

Conclusion: there seems to be no bias in each shuffle and the shuffle seems to be uniformly random. Although that seems to be the case, this sample size is too small to spot for bias and there might be other factors that I may have not taken into account when checking for bias.