1) Group Members: Arifa Begum, Nene Diallo, Sun Wo Kim, Leonardo Alcaide, Maria Camila

2) Through Lab #1, it seems that simple variations where we altered the dice surprisingly increased the amount of time a six was rolled compared. With the normal dice, there seemed to be a 25% chance for a 6 to roll. On the other hand, with the altered dice, there seemed to be a 60% chance of rolling a 6 which is drastically higher. This demonstrates how altering the physical dice and changing the tactic you use to roll has an impact on its fairness. In other words, this is something to keep in mind when the goal is to conduct a fair dice experiment. The rules we came to terms with is that if a 6 was rolled 2-4 times out of 10 times, it is fair. If we roll a 6 less than than or more than that, it is unfair. Altering the physicality of the dice seems to increase the chances of getting a 6 so that could be ruled as unfair. This result itself is really interesting to me. It is also interesting how altering it also led to certain numbers coming up too like 3s and 5s. Based on our class, I think we all were under the impression that altering the dice wouldn't make a drastic change in the outcome but it did.

3) The playlist contains 20 different Surahs (each Quran chapter is called a Surah), giving each Surah a 1 in 20 (or 5%) chance of being selected. However, two Quran reciters—Mishary Al Afasy and Yasser Al Dosari—each have 4 of their recitations in the playlist. This means Surahs recited by them have a combined 20% chance of being played. All the other Surahs are recited by different Quran reciters, with each of these reciters contributing only one Surah.

Null Hypothesis: All 20 Surahs should have an equal chance of being selected, meaning a 5% chance for each Surah.

Alternative Hypothesis: The shuffle function shows favoritism toward Surahs from the same reciters.

Null hypothesis: $p = 1/20$

Alternative hypothesis: $p \neq 1/20$

Synopsis: For the experiment, only 5 Surahs will be played. Since the shuffle automatically resets, no Surah will repeat until all the Surahs in the playlist have been played. Ideally, the 5 randomly selected Surahs should come from 5 different reciters, with just one Surah from each

of the two reciters. To test whether Shuffle is truly randomized, we used three different modes, Spotify Free, Spotify Premium, and Apple Music, to reduce the risk of favoritism and also to test whether or not one app was more randomized than the other.

Playlist Link:
Quran Reciation Playlist

Shuffle#1 (Spotify – Free)	**Shuffle#2 (Apple Music-Premium)**	**Shuffle#3 (Spotify - Premium)**
Surah Muminoon recited by Yasser Dosari	Surah Al Nas recited by Sheikh Minshawi	Surah Al Anaam recited by Abdul Basit
Surah Az Zumar recited by Mishary Al Afasy	Surah Al Araf recited by Muhammad Al Luhaidan	Surah Ya-Sin recited by Al Sudais
Surah Mulk recited b Ibn Bashir	Surah Taha recited by Ismail Annuri	Surah Muminoon recited by Yasser Dosari
Surah Taha recited by Ismail Annuri	Surah Mulk recited b Ibn Bashir	Surah An-Nisa recited by Nasser Qatami
Surah Al Waqiah recited by Islam Sobhi	Surah Az Zumar recited by Mishary Al Afasy	Surah Al-Emran recited by Noreen Muhammad Siddique

We fail to reject the null hypothesis, as each shuffle from the experiment played 5 different Surahs from 5 different reciters, showing a lack of favoritism. Although throughout the 3 shuffles, some Surahs repeat, they never repeat in the same order and aren't followed by Surahs from the same reciters. However, more testing is needed to fully assess the fairness of the shuffle. A future experiment with 50 Surahs, where 40% of the Surahs are recited by just two reciters, might provide better insight into whether the shuffles truly don’t favor specific reciters.