Irania Matos
Econometric- HW 2
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Lab 1 Results.

For lab 1 we decided to find the counts how many times each face (1–6) appeared in 40 rolls and 1000 rolls, using the following codes.

```
sim_rolls_40<-sample(1:6, size=40,replace=TRUE)
sim_rolls_1000<-sample(1:6, size=1000, replace=TRUE)
```

Our results were the following:

#of Rolls	1	2	3	4	5	6
40	10	2	8	6	5	9
Proportions	*0.175*	*0.075*	*0.175*	*0.175*	*0.225*	*0.175*
1000	167	177	152	164	176	164
Proportions	*0.170*	*0.151*	*0.173*	*0.176*	*0.188*	*0.142*

We found interesting that when it's only 40 rolls, the distribution of die faces is uneven and may not look fair, but with 1,000 rolls, the proportions are much closer to the expected 1/6 for each side. This demonstrates the law of large numbers: as the number of trials increases, the observed frequencies converge to the theoretical probability.

Playlist experiment

I created a playlist on Apple music with 40 songs in total and did a shuffle of this playlist and reordered the name of the song and artist.

Experimental setup

- Apple Music
- N= 40 songs
- 15 different Artists
- Some artists are repeated (no more than 3 songs from the same artists)

Hypothesis

- **H_0 (null):** Shuffle order is random (any permutation of 40 is equally likely).
- **H_1 (alt):** Shuffle algorithm biases toward or against certain artists appearing near each other.

Recorded data

- **Ariana Grande**: appears at play #4, #23, #39 → fairly spread out.
- **Bad Bunny**: plays at #5, #25, #29 → some clustering in the second half.
- **Cardi B**: plays at #7, #24 → moderately apart.
- **Dua Lipa**: plays at #11, #13 → very close (2 songs apart).
- **Lady Gaga**: plays at #31, #32 → back-to-back
- **Miley Cyrus**: plays at #15, #21 → reasonably spaced.
- **Romeo Santos**: plays at #8, #38 → spread out.
- **Karol G**: plays at #33, #40 → end clustering.

Conclusion

I have 40 songs, and each song appeared exactly **once** in your recorded 40 plays. However, looking at artist clustering, I saw a few interesting patterns (Lady Gaga consecutive, Dua Lipa close together, Bad Bunny somewhat clustered). These are suggestive, but not conclusive. For next time, I would need to select a larger data to have a better conclusion.