DON BOSCO INSTITUTE OF TECHNOLOGY, KURLA, MUMBAI - 400070

SUBJECT: - ENGINEERING MATHEMATICS – IV

Title: - Analysis of Even Number Frequencies in Random One-Digit Number Generation Trials

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- **Acknowledgement:-**

The satisfaction that accompanies the successful completion of this project wouldbe incomplete without the mention of the people who made it possible. We consider ourselves privileged to express gratitude and respect towards all those who guided us through the completion of this project.

We would also like to express special thanks of gratitude to our teacher Mr. Satya Sir, who gave us the golden opportunity to work on this wonderful project of “Analysis of Even Number Frequencies in Random One-Digit Number Generation Trials” and also for providing encouragement, constant support and guidance which was of a great help to complete this project successfully.

- **Abstract:**

This research explores the distribution tendencies of even numbers within randomly generated one-digit numerical sequences, employing a structured series of experimental trials. The methodology encompasses the generation of sets comprising 100 one-digit numbers across a spectrum of trials, ranging in size from 10 to 1000. Each trial meticulously documents the frequency of even numbers occurring within the generated sequences. Subsequently, these recorded frequencies are subjected to comprehensive analysis and visually represented through graphical plots, which juxtapose the count of even numbers against their corresponding frequencies. The principal objective of this investigation is to discern discernible trends or variances in the prevalence of even numbers across differing trial magnitudes. The findings derived from this study aim to shed light on the innate randomness and distribution dynamics inherent within one-digit numerical datasets, providing valuable insights into the nuanced behavioral patterns exhibited by even numbers within such contexts. By offering a deeper comprehension of probability distributions and statistical tendencies within elementary numerical datasets, this study contributes to the broader understanding of stochastic processes and their implications in various fields, including mathematics, statistics, and data analysis.

- **What is the project about?**

The project is a systematic exploration of how even numbers are distributed within sets of randomly generated one-digit numbers. Its core objective is to understand the patterns and variations in the occurrence of even digits across different trial sizes.

To achieve this, the project follows a structured approach. It begins by generating sets of one hundred one-digit numbers, varying the number of trials from as low as ten to as high as one thousand. These sets are created randomly to ensure unbiased sampling. Within each trial, the frequency of even numbers appearing in the generated sequences is meticulously recorded.

Following data collection, thorough analysis is conducted. The recorded frequencies are scrutinized to identify any discernible trends or variations. This analysis helps reveal insights into how often even numbers tend to appear within one-digit numerical sequences and whether this frequency changes with the size of the dataset.

To visually represent the findings, graphical plots are employed. These plots illustrate the count of even numbers against their corresponding frequencies. Such visualizations offer a clear depiction of the distribution patterns and allow for easier interpretation of the data.

The project's significance extends beyond mere observation of numerical occurrences. By understanding how even numbers are distributed within one-digit sequences, it sheds light on fundamental concepts of randomness and distribution dynamics. Furthermore, it provides valuable insights into the behavior of numerical datasets, contributing to a deeper understanding of probability distributions and statistical tendencies.

Ultimately, this project's findings could have implications across various domains, including mathematics, statistics, and data analysis. By unraveling the mysteries of numerical distributions, it paves the way for improved modeling, prediction, and decision-making in real-world scenarios.

- **What problems were tackled?**

The project addresses several key problems:

1. **Distribution Analysis:** One problem tackled is the analysis of the distribution of even numbers within randomly generated one-digit numerical sequences. Understanding how even numbers are distributed within such sequences is essential for comprehending the underlying randomness and distribution dynamics.
2. **Trend Identification**: Another problem addressed is the identification of trends or variations in the occurrence of even numbers across different trial sizes. By systematically varying the number of trials and analyzing the resulting data, the project aims to uncover any discernible patterns or fluctuations in the prevalence of even digits.
3. **Insight Generation:** The project seeks to generate insights into the behavior of numerical datasets, particularly regarding the occurrence of even numbers. By scrutinizing the recorded frequencies and visualizing the data through graphical plots, the project aims to provide valuable insights into the nuanced behavioral patterns exhibited by even numbers within one-digit numerical sequences.
4. **Statistical Understanding:** Additionally, the project contributes to a deeper understanding of probability distributions and statistical tendencies. By investigating the distribution patterns of even numbers, it helps enhance comprehension of statistical concepts and their implications in various fields, including mathematics, statistics, and data analysis.

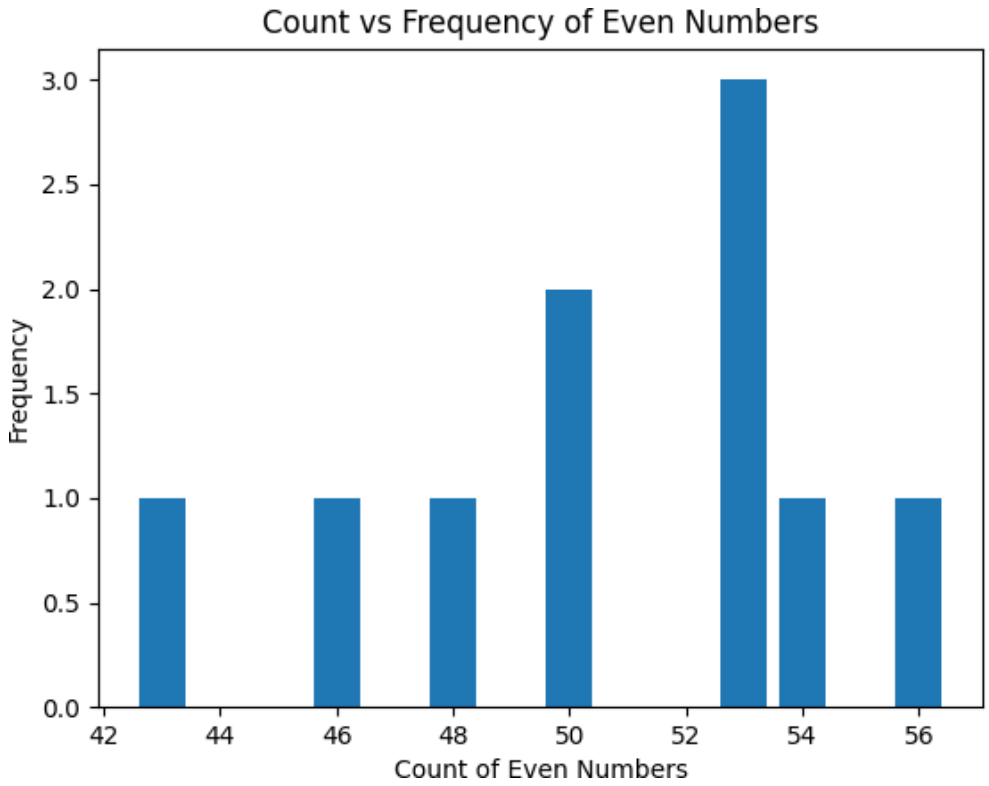
Overall, the project tackles these problems to advance understanding in the realms of numerical distributions, randomness, and statistical analysis.

- **Problem Statement**

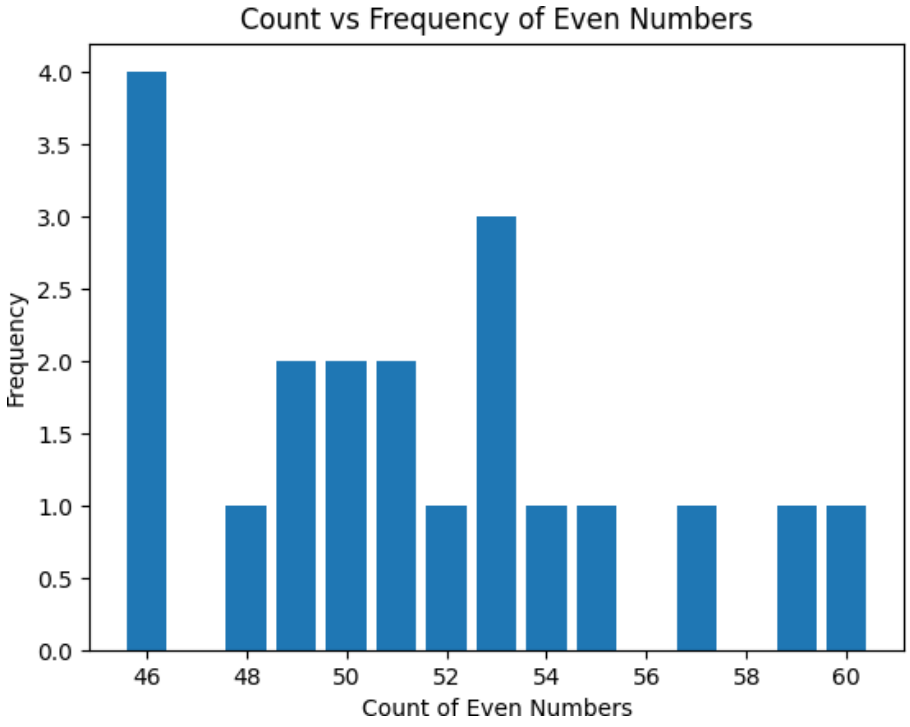
Generate 100 one digit numbers randomly.
Draw the frequency curve of digits vs frequency.
Record the number of times you have obtained an even number
Next perform 10 trials of generating 100 one digit numbers
Step 1: Find the number of times you have obtained an even number
in each trial- that is, Count
Step 2: Draw the graph of Count vs frequency for
all the trials put together.
Next perform 20 trials of generating 100 one digit numbers
Repeat Steps 1 and 2.
Increase the number of trials to 30, 40, $\cdots$, 100, 200, $\cdots$, 1000, $\cdots$
Repeat Steps 1 and 2 in each case.

- **Analysis:-**

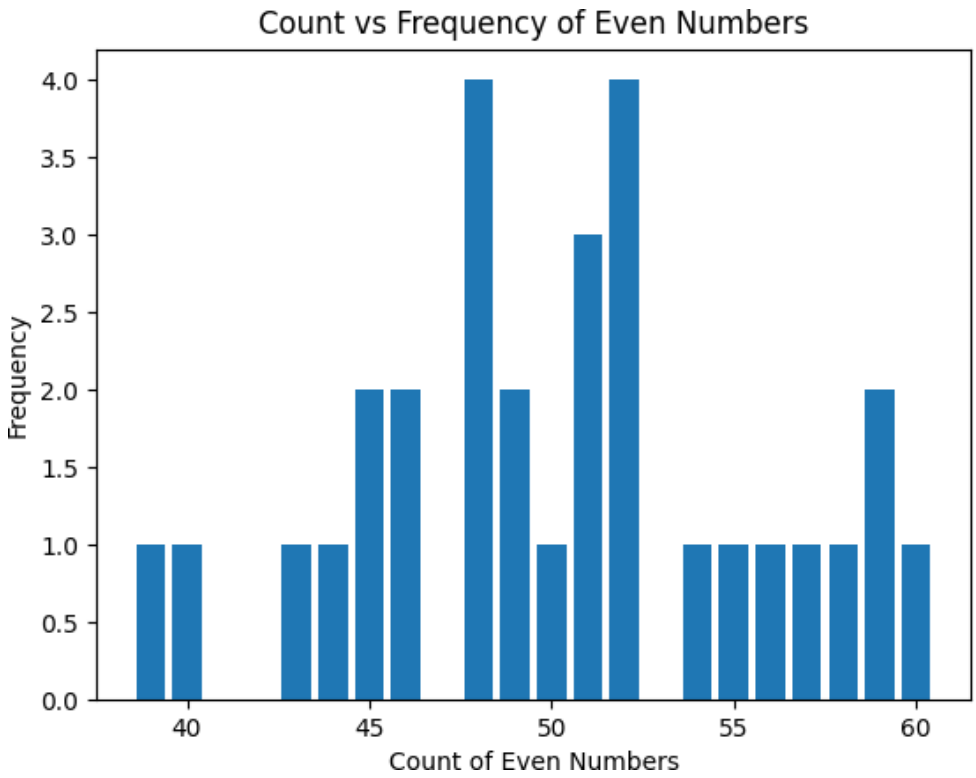
Number of Trials: 10



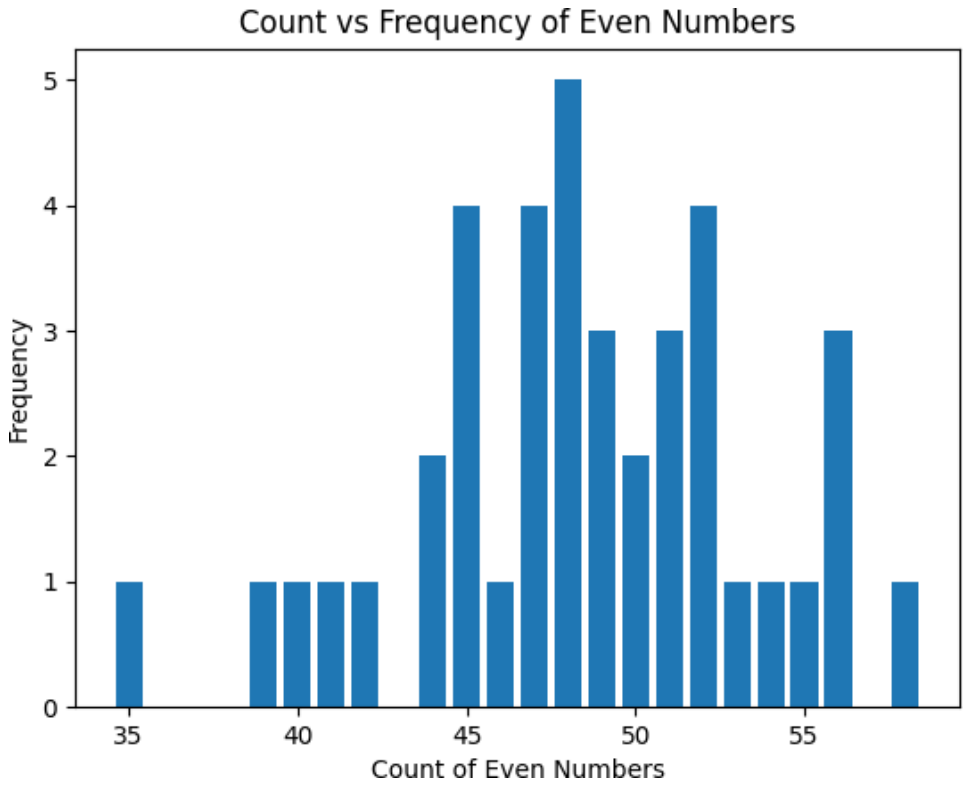
Number of Trials: 20



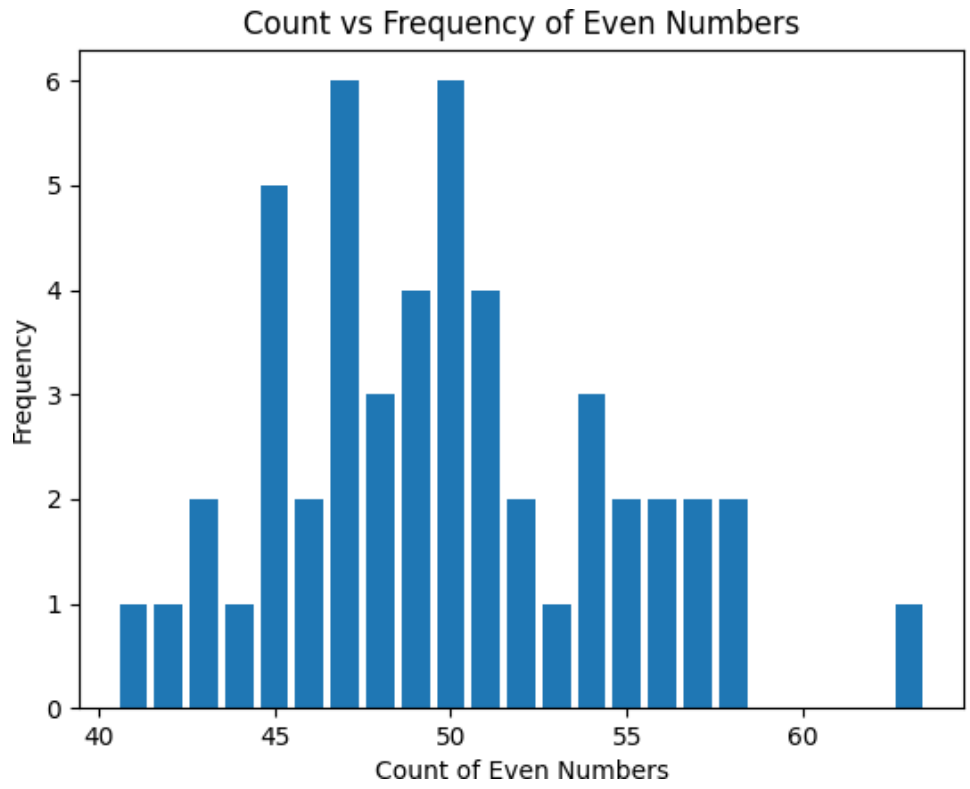
Number of Trials: 30



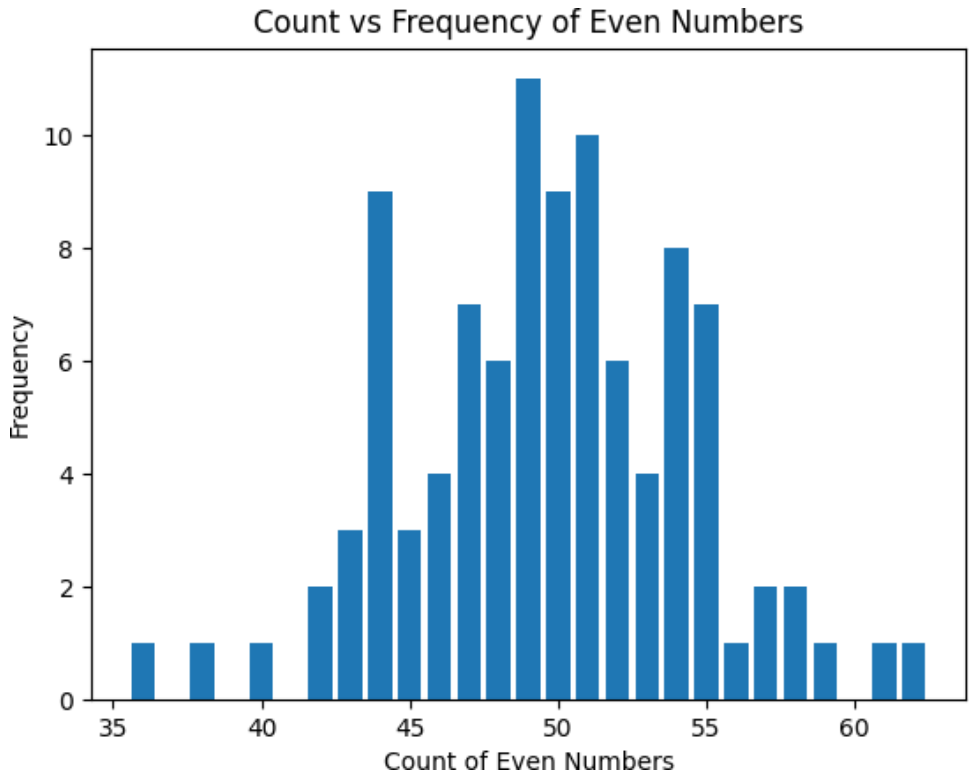
Number of Trials: 40



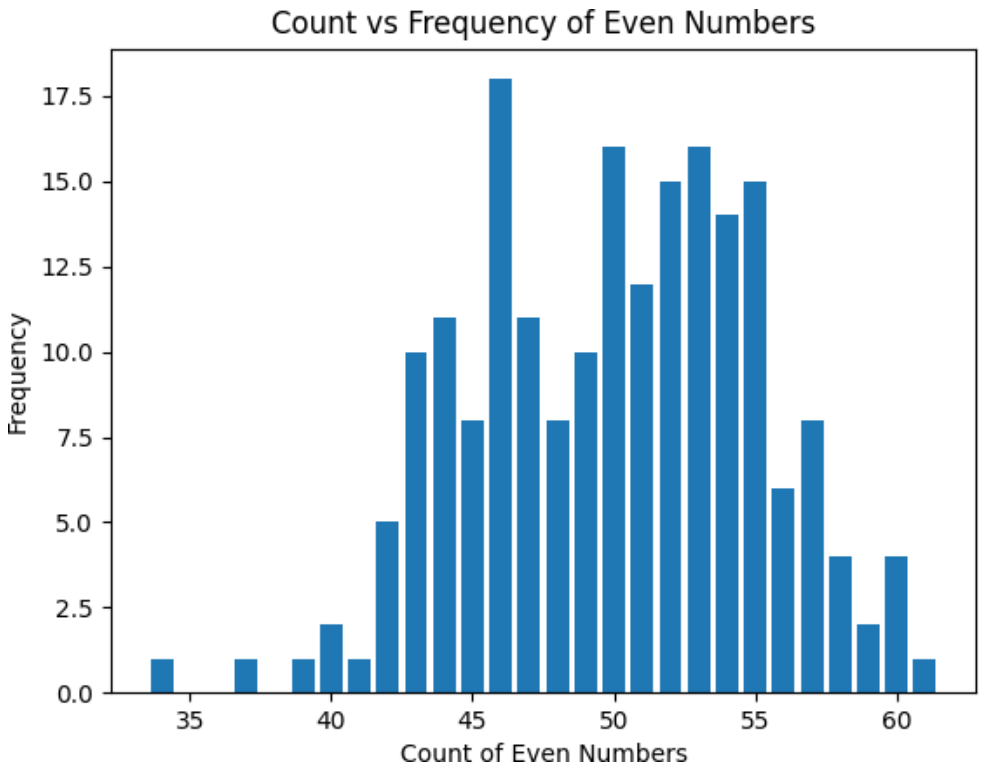
Number of Trials: 50



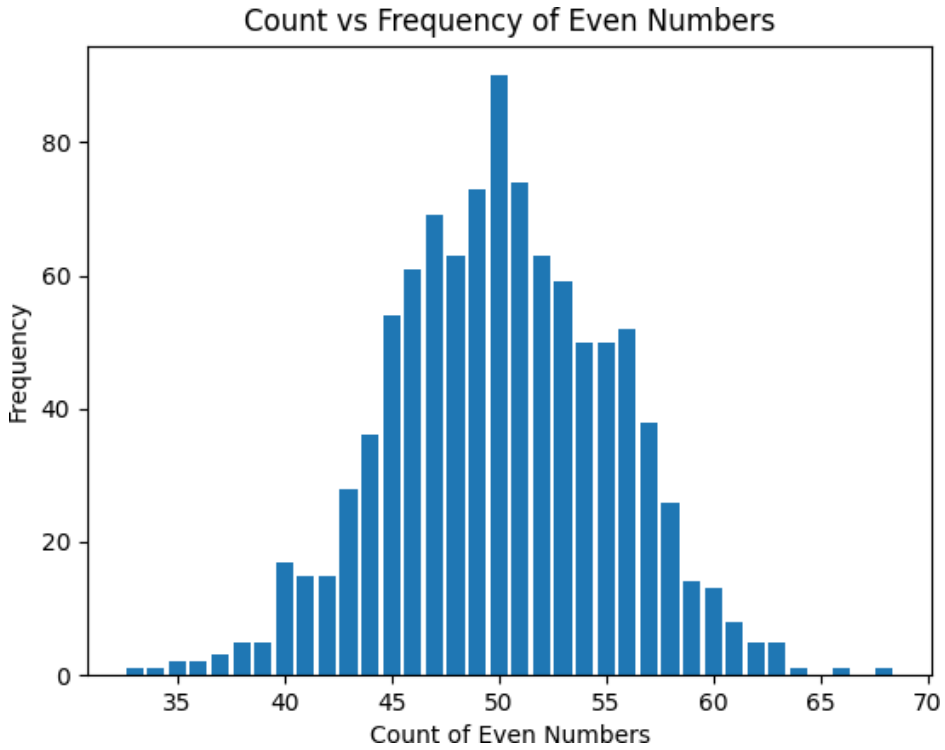
Number of Trials: 100



Number of Trials: 200



Number of Trials: 1000



- **Observation: -**

1. **Frequency Distribution:** The output graphs display the frequency distribution of even numbers across different trial sizes. Observing the heights of the bars in the graphs can provide insights into the frequency at which even numbers occur within the randomly generated one-digit numerical sequences for each trial size.

2. **Trend Analysis:** By examining the output graphs for each trial size, one can identify any trends in the frequency of even numbers as the number of trials increases. This analysis helps understand whether the occurrence of even numbers tends to stabilize, increase, or decrease with larger sample sizes.

3. **Variability:** The output may reveal variability in the frequency of even numbers across different trials of the same size. This variability could indicate the influence of randomness or sampling variation in the generation of one-digit numbers.

4. **Comparison Across Trial Sizes:** Comparing the output graphs for different trial sizes allows for the observation of how the distribution of even numbers changes with varying sample sizes. This comparison helps understand the impact of sample size on the observed frequencies of even numbers.

5. **Statistical Insights:** Statistical analysis of the output data, such as calculating mean, median, and variance of even number frequencies, can provide insights into the central tendency and variability of the data. Additionally, conducting statistical tests can determine whether the observed differences in even number frequencies between trial sizes are statistically significant.

- **Individual Responsibilities of each team member:-**

For performing different aspects, we distributed each subtopic among ourselves :

1) **Amisha Verma**:- contributed in the code and research
2) **Merina George Thoppil**:- contributed in code and research
3) **Ashita Salis**:- contributed in the conclusion and graphs.
4) **Ria Dcosta**:- contributed in the abstraction, acknowledgment.
5) **Sasha Dcosta**:- contributed in the objective and observations.
6) **Rhea Paul**:- contributed in the objective and observations and information gathering

- **Conclusion: -**

The experiment conducted aimed to investigate the distribution patterns of even numbers within randomly generated one-digit numerical sequences across varying trial sizes. the experiment yields valuable insights into the distribution patterns of even numbers within randomly generated one-digit numerical sequences. By analyzing the output graphs and conducting statistical analyses, we gain a better understanding of probability distributions, randomness, and statistical tendencies within numerical datasets. These findings contribute to broader knowledge in mathematics, statistics, and data analysis, with potential applications across various fields.

- **References: -**

https://www.random.org/integers/
https://docs.python.org/3/
https://towardsdatascience.com/
Matplotlib Documentation