

**IC-252 Lab**  
**Lab Assignment 1**  
**due for submission on Moodle by 19<sup>th</sup> Feb**

1. Generate  $n$  random numbers in the range 0 to 100.
2. Display the frequencies of each random number generated in 1 using a bar graph.  
Perform the experiment for  $n=1000, 2000, 5000$ .

**Birthday Paradox**

3. Let the number of students in your class be  $n$ . Generate a random number from 1 to 365. We will thus have  $n$  birthdays. Find the probability that at least two people have the same birthday, denoted by  $p$ . For this case do the following by simulating the situation 1000 times:
  - A. Find the probability for  $n=23, 40, 80, 300$  and comment on the probabilities obtained.
  - B. Plot  $p$  vs  $n$  where  $n$  varies from 1 to 300.
  - C. Find the minimum value of  $n$ , for which the probability becomes 0.8 or greater.
4. One Venus day lasts 243 earth days. If  $n$  number of people are born on a Venus day, find the probability that they share the same birthday according to the earth days. At some place on Venus there's sunlight for 122 days and night for 121 days. Assume that a person is twice as likely to be born in daytime than at night. Compare the probabilities for the same values of  $n=23, 40, 80$ . Plot  $p$  vs  $n$  where  $n$  varies from 1 to 243. [Hint: use `numpy.random.choice` to generate random numbers with specified probabilities. Take care that the sum of probabilities should be 1]

**About `numpy.random.choice()`:**

`numpy.random.choice(a, size=None, replace=True, p=None)`

**Parameters:**

- 1) **a** – 1-D array of numpy having random samples.
- 2) **size** – Output shape of random samples of numpy array.
- 3) **replace** – Whether the sample is with or without replacement.
- 4) **p** – The probability attached with every sample in a.

**Output :** Return the numpy array of random samples.

*Reference:* [numpy](#), [numpy.random.choice](#)

In case of queries contact:

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