

# 11.16.3.6

EE24BTECH11004 - Ankit Jainar

**Question:** There are four men and six women on the city council. If one council member is selected for a committee at random, how likely is it that it is a woman?

## THEORETICAL SOLUTION

The total number of council members is:

$$|S| = 4 + 6 = 10 \quad (1)$$

The favorable outcomes (selecting a woman) are:

$$|A| = 6 \quad (2)$$

The probability of selecting a woman is:

$$P(A) = \frac{|A|}{|S|} = \frac{6}{10} = 0.6 \quad (3)$$

## INTRODUCTION

This task involves simulating the random selection of council members using a C program, compiling it into a shared object (.so) file, and using Python to process the results and generate a probability distribution plot.

## C CODE DESCRIPTION

The C program generates random samples for the selection process, where the outcomes are categorized as either "man" or "woman". The program uses the `rand()` function to simulate the random selection and increments a counter for each outcome.

## PYTHON CODE DESCRIPTION

The Python code performs the following:

- 1) Loads the shared object file generated from the C program using the `ctypes` library.
- 2) Simulates a specified number of random selections (e.g., 1,000,000 trials).
- 3) Calculates the probability of selecting a woman using the formula:

$$P(\text{woman}) = \frac{\text{frequency of selecting a woman}}{\text{total trials}} \quad (4)$$

- 4) Plots the probability distribution using `matplotlib`.

### GRAPHICAL OUTPUT

The Python code generates a bar chart where:

- The x-axis represents the outcomes: "Man" and "Woman".
- The y-axis represents the probabilities, ranging from 0 to 1.
- The bar height for "Woman" corresponds to the probability  $P(A) = 0.6$ .

### STEMPLOT DISTRIBUTION

The stemplot shows a single vertical line at "Woman" on the x-axis with a height corresponding to its probability (0.6).

### CONCLUSION

This task demonstrates the integration of C and Python for simulating and visualizing a probabilistic experiment. The probability of selecting a woman from the council is calculated as **0.6**, matching the theoretical value.



