**MT2002 Statistical Modeling**



|  |  |
| --- | --- |
| **Assignment No:** 01 | **CLO:** |
|  | **Semester:** Fall2023 |
| **Due date: 11**-Sep -2023 | **Marks:**  100 |

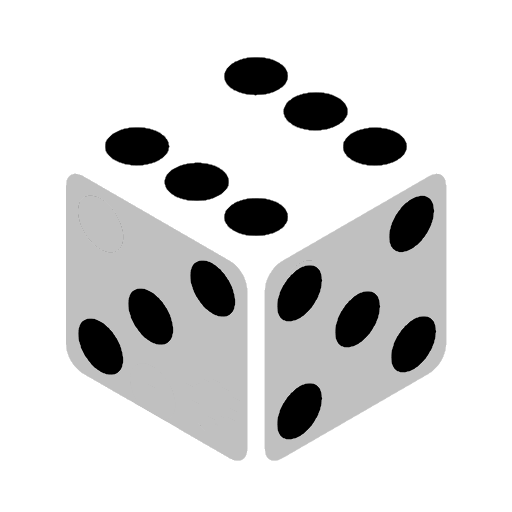
**Instructions:**

1. **Plagiarized work will result in zero marks.**
2. **No retake or late submission will be accepted.**
3. The assignment is to be submitted in softcopy; **Jupiter notebook file is recommended**.
4. The softcopy should be a single file of your complete assignment.
5. Your submission file should be according to the following **format: id\_section\_A1** e.g., i22123456\_A\_A1. A1 in the end denotes Assignment 1.
6. **Marks distribution for this assignment.**

|  |  |
| --- | --- |
| **Task** | **Marks** |
| Defining model in pymc3 with observed data  Prior  &  Likelihood | **50** |
| Testing each prior for estimation | **10 each** |

**Questions: 1:**

The purpose of this assignment is to familiarize you with defining a model in pymc3 i.e., specifying the **prior** and **likelihood** in order to estimate parameter. Given below is the description of the problem. Your task is to create a pymc3 model in order to estimate the probability in this case.



**Problem Description:**  Assume you are interested in estimating the probability of specific number in ludo dice. You have conducted 150 rolls of Ludo dice and recorded the results. Out of these 150 rolls, '6' appeared 39 times. Your task is to use pymc3 to estimate the probability of rolling a '6' on the Ludo dice.

Define a model in pymc3 containing **prior** and **likelihood**. Test two priors **Uniform** and **Beta** distributions. Test **Beta** distribution as a prior with varying parameter values and compare the resulting estimations of the probability of rolling a '6'. Include these comparisons and insights in your submission for analysis. For instance, see the following table and test your model with different priors and parameters as given in the following table. Please select your choice of parameter value and observe how it affects results. Is there any change in estimate with respect to change in prior and parameter of prior?

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Choice of Prior** | **Parameters** | **Model Estimate** |
| 1 | Uniform | lower=? upper=? | ? |
| 2 | Beta | alpha=1 beta=1 | ? |
| 3 |  | alpha=? beta=? | ? |
| 4 |  | alpha=? beta=? | ? |
| 5 |  | alpha=? beta=? | ? |