Assignment-1

Simulate the three strategies (as discussed in the class) to estimate the probabilities obtained by each of the three sampling strategies. You are allowed to use any language and random sampler.

You should submit a single zip package containing the source code and a **README** file that describes how the code can be run. You can do the project in a team with at most 5 members (including you).

Assignment-2

Find the number of students in a class such that the probability that at least two students have the same birthday is greater than 'p' (as discussed in the class). You are allowed to use any language. Your program should input the required probability 'p' and return the number of students (k).

You should submit a single zip package containing the source code and a **README** file that describes how the code can be run. You can do the project in a team with at most 5 members (including you).

Assignment-3

Consider a generalized Monty Hall Problem where there are n doors, with k of the doors having cars and the remaining doors having goats. The host opens one door. Design a simulation to assess the probability of winning for switching (W) versus sticking (T) to the original decision. Plot a surface plot of n, k versus ($P(win|W)/P(win|T)$). What can you infer from the plot?

You are allowed to use any language and random sampler. You should submit a single zip package containing the source code and a **README** file that describes how the code can be run. You can do the project in a team with at most 5 members (including you).

Assignment-4

Use a random number generator for uniform distribution to design a sampler for the Gaussian Distribution (within a provided interval $[a, b]$) using the Inverse **CDF** method. Plot a histogram using random numbers from your sampler to show that your sampler is behaving correctly.

You are allowed to use any language. You should submit a single zip package containing the source code and a **README** file that describes how the code can be run. You can do the project in a team with at most 5 members (including you).

Assignment-5

Consider that you have a certain prior belief about a coin that is in your possession, that its bias is distributed as:

Case 1) $Beta(2, 5)$
Case 2) $Beta(5, 2)$
Case 3) $Beta(1, 1)$
Case 4) $Beta(2, 2)$

Now, tossing the coin 10 times results in the following outcome:
$[H, H, H, T, T, T, H, H, H, T]$

Plot the posterior distribution based on the above observation corresponding to each of the priors. Draw lines for the **MLE** and **MAP** estimates on the plots.

You are allowed to use any language and random sampler. You should submit a single zip package containing the source code and a **README** file that describes how the code can be run. You can do the project in a team with at most 5 members (including you).