

Code Task 1: Submit the .cpp files to solve the task below, do not use code from the STL, make sure to reference all the sources you used to solve the problem.

The birthday paradox is that there is a surprisingly high probability that two people in the same room happen to share the same birthday. By birthday, we mean the same day of the year (ignoring leap years), but not the exact birthday including the birth year or time of day. Write a program that approximates the probability that two people in the same room have the same birthday, for 2 to 50 people in the room.

The program should use simulation to approximate the answer. Over many trials (say, 5000), randomly assign birthdays to everyone in the room. Count the number of times at least two people have the same birthday, and then divide by the number of trials to get an estimated probability that two people share the same birthday for a given room size.

Your output should look something like the following. It will not be the same due to the random numbers:

```
For 2 people, the probability of two birthdays is about 0.002
For 3 people, the probability of two birthdays is about 0.0082
For 4 people, the probability of two birthdays is about 0.0163
...
For 49 people, the probability of two birthdays is about 0.9654
For 50 people, the probability of two birthdays is about 0.969
```

Discussion Task 1: For this task you will submit a short video (5 mins max).

In the video discuss and explain for the code you submitted in task 1 above,

1: Identify, and discuss any Data Structures (for example an array) you have used, for example, why you chose that data structure, why it is suitable etc. Also discuss and explain the Algorithm you used, for example, why you have loops and why they stop, etc.

2: Discuss all the ways you could optimise the code that you used to make it be more efficient. Have at least a minimum of 4 ways