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**Monte Carlo Programs**

**What is a Monte Carlo Simulation?**

A Monte Carlo simulation is a technique that uses random sampling to estimate the probability of various results in uncertain conditions. This allows us to get a greater picture of events that occur. These randomized trials can help us determine probability of these events with greater accuracy due to their randomness.

**What is Monte Carlo Simulations did I run?**

There are a couple of Monte Carlo Simulations that I ran to figure out the probability of certain events.

The first Monte Carlo simulation is the birthday program. This program creates several people with random birthdays. Then this program checks if that set of people created share a birthday. This is done over many simulations, then we calculate the amount of sets of people who share a birthday over the total amount of simulations, allowing us to see how likely it is that a set of random people share a birthday.

The second Monty Carlo simulation is the Monty Hall game. In this game, there are 3 doors, with one door having a prize behind it. This program randomizes which door has the prize but also randomizes what door it chooses. If they happened to guess correctly, the number of guesses is added up then divided by the total amount of times the program chose a door. This lets us see that in a completely random environment, probability is still able to be calculated.

The next two Monte Carlo Simulations deal with the Pokémon Game created. The first of them is the Mulligan Monte Carlo simulation. This program checks the probability that you get a Pokémon in your opening hand depending on the amount of Pokémon in your deck. The amount of Pokémon in the deck grew every simulation until 60 Pokémon populated the deck, which then it is impossible to have a Mulligan. The program deals with Rare Candy, a card that allows a Pokémon to evolve. We are checking the probability that a deck is bricked, meaning no Rare Candies are within the deck, prize pool, and your hand.

Below are results of the Monte Carlo Simulations

**Birthday Monte Carlo Simulation Results (10,000 simulations run 10 times)**

**Pokemon Mulligan Monte Carlo Simulation Results**

**Pokemon Rare Candy Brick Chance Monte Carlo Results**

**Code output for Pokemon Mulligan Monte Carlo (after Poke count 45, it is all 0.00%)**

**A screen shot of a computer screen

AI-generated content may be incorrect.**

**Code output for Pokemon Rare Candy Monte Carlo**

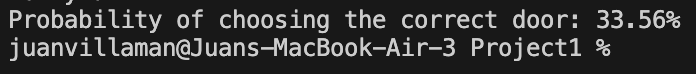
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AI-generated content may be incorrect.**

**Code output for Birthday Monte Carlo**

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**Code output for Monty Hall game Monte Carlo**

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