**CSC 630 Introduction to Data Science**

**Assignment: Visualization**

**Background**

It’s important to be able to create plots so we can visualize data and experimental results.

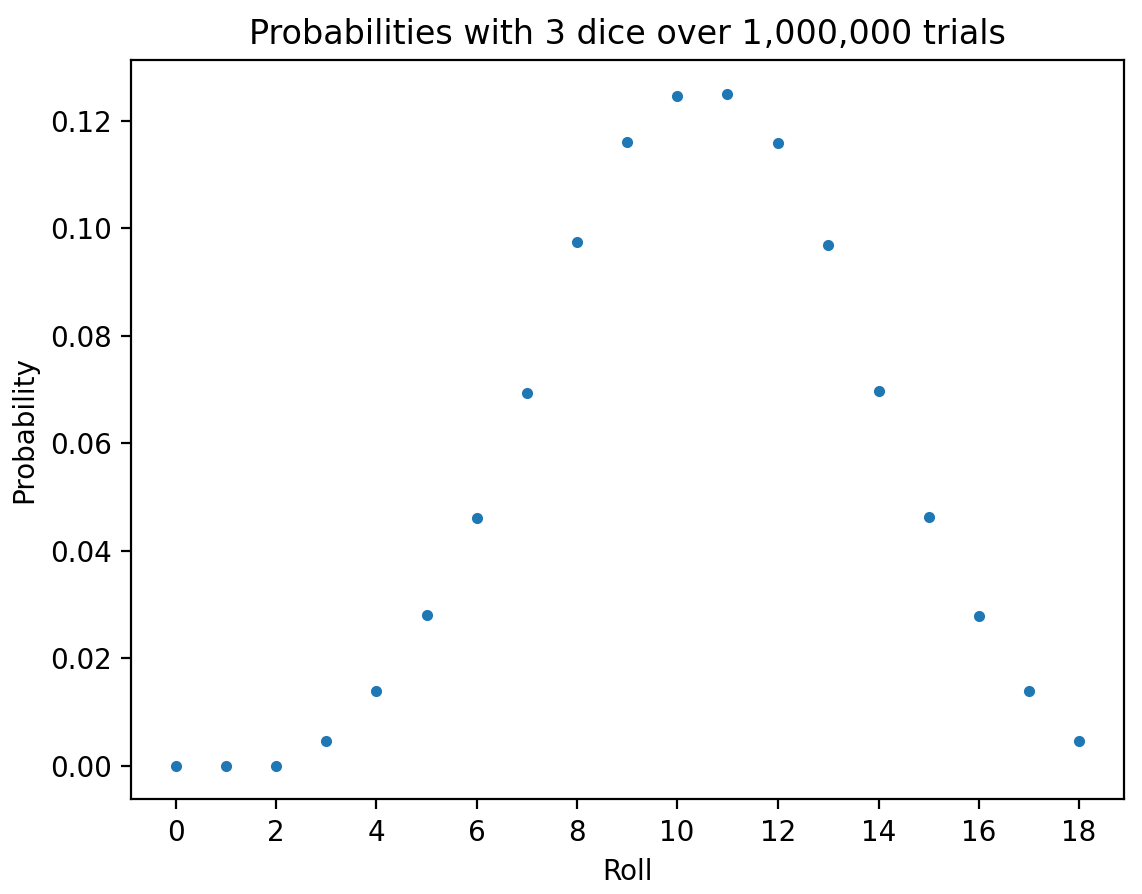
**Procedure**

Carry out a Monte Carlo experiment to determine the probabilities of rolling various numbers with a given number of dice. A Monte Carlo experiment, named after the Monte Carlo casino on the Mediterranean coast of Monaco, is based on using random numbers to simulate experimental results. In this case, you will simulate dice rolls. Use an infinite loop to allow the user to choose the number of dice and the number of trials (simulated rolls) for each experiment. End the program if the user types ‘quit’ or ‘Quit’ for either the number of dice or number of trials. For full credit, use numpy to count the rolls and calculate the probabilities. Plot the results using Matplotlib; use a dot to represent each data point. The figure below shows an example plot for 4 dice and 100000 trials. Also print the probabilities to the console. Be sure your plot is titled appropriately, and the axes are labelled appropriately.

I suggest you use a numpy array with num\_dice elements, and dtype np.int64, to count the number of occurrences of each roll. Divide that array by num\_trials to get the probabilities. Round the probabilities. For less than 5 dice, round the probabilities to 3 decimal places; for 5 or more dice, the probabilities of the edge values are so low that you will need 5 decimal places. It can take a while to run experiments with a large number of trials but your program should run in a reasonable length of time. My implementation, for 1,000,000 trials, takes 12 to 14 seconds on my computer, regardless of the number of dice. Your implementation might take a bit longer but I should not be able to make a cup of tea while I’m waiting.

**Deliverables**

Name your program Asn2\_username.py, where username is your MSU user name and turn it in on Blackboard. For example, I would name my program Asn2\_ls555.py. **Do your own work – your program will be checked for originality by software designed to compare programs.**

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