Programming 1: Lab 10 : Dictionaries and Functions

Write the python code for the following questions. Handle all the valid and invalid test cases. Write down relevant comments in your code:

1. Take a paragraph from a user: calculate frequency of vowels, store it in dictionary. Display the frequency counts in ascending order of the counts.
2. A 6 sided dice is rolled N times (where N is >=10000).
    1. Write a program that randomly generates these N dice roll outcomes and finds the frequency counts of each outcome. Use a function to generate the list of random values and return the list. A second function will find the frequency counts and return the counts. The third function will only display the frequency counts.
    2. Extend the above program by considering a hypothetical dice of 100 sides. Use dictionaries for this. Please note that you do NOT have to use any library functions (e.g., itertools).
3. Take numbers from a user until they say "over". If user enters odd number, add it in dictionary named "Odd" with number as key value and its square and cube as values. If user enters even number, information will be moved to the dictionary named "Even"
    Sample: Even = {2:[4,8], 8:[64,512]}, Odd={1:[1,1], 5:[25,125]}
4. Design a calculator such that your program takes two operands and provides a menu of operator choices as shown below. It then checks for the validity of the operands (e.g., b cannot be 0 for a/b) and then displays the result. The menu is displayed again until the user selects a choice to quit the program. Use functions and perform the following operations over two operands.
    1. Addition.
    2. Subtraction.
    3. Multiplication.
    4. Division.
    5. Modulus
    6. Exponentiation.
5. Given a list of N numbers, write a function to shift the numbers circularly by some integer k (where k < N). The function should take a list and k as arguments and return the shifted list.
    1. Write a function that assumes shifting is to the left.
    2. Write a function that takes a third argument that specifies shifting left or right.
    Hint:
    original list: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
    shifted by 4, to the left: [4, 5, 6, 7, 8, 9, 0, 1, 2, 3]
    shifted by 4, to the right: [6, 7, 8, 9, 0, 1, 2, 3, 4, 5]
6. Write recursive functions for the following:
    1. Find the factorial of an input positive integer.
    2. Find the sum of first N positive integers.
    3. Display the Fibonacci series till N terms.