INSY 5336
Python Programming
Spring 2021
Homework 2 (50 points)

Due Date: Mar 25th, 2021, 7:00 pm CST (no exceptions)

The following guidelines should be followed and will be used to grade your homework:

- All code to be implemented and submitted as a jupyter notebook (.ipynb) file.
- This is an individual homework assignment, no group submissions will be accepted. If you discuss in groups, please write your code individually and submit.
- Sample runs shown in the question should be used as a guide for implementation. However extensive testing needs to be done on your code to deal with all test cases that might possibly be executed.
- The high level algorithm, instructions for running of each cell and the expected results should be documented in the cell preceding the code using markdown language.
- Every code segment in the jupyter notebook cells should be well documented with comments. Use # in the code to provide comments and they should explain the algorithm and what the code segment is doing.
- Error checking in your code is very important and differentiates a high quality programmer from a low quality one. Hence you should account for invalid user inputs, infinite loops, out of range results, missing files, etc. and resolve them by appropriate error messages. The homework will be graded for robustness of your code.

1. (10 points) “Rock-paper-scissors is a hand game that is played by two people. The players count to three in unison and simultaneously "throw" one of three hand signals that correspond to rock, paper or scissors. The winner is determined by the rules:
   - Rock smashes scissors
   - Scissors cuts paper
   - Paper covers rock

   Rock-paper-scissors is a surprisingly popular game that many people play seriously (see the Wikipedia article for details).
   Write a Python program to ask the user’s choice of Rock paper scissors. The program then, randomly, chooses a choice for itself (the computer) and then compares it with the user’s choice. The final output should show, the user’s choice, the program’s choice and the winner.
   Sample runs are shown below:

   ```
   Enter your choice: rock
   Computer chooses scissors
   You, the user, win!
   ```

```
Enter your choice: paper
Computer chooses: scissors
I, the computer, win!

Enter your choice: scissors
Computer chooses scissors
User and computer tie!
```

2. (10 points) Write a program where the user and the program/computer trade places in the number guessing game. Prompt the user for a number (between 1 and 100, inclusive) that the program/computer has to guess. Keep track of the number of iterations it takes for the computer to guess the number. Sample runs are shown below:

```
Enter number to be guessed: 88
You guessed 88, and it took the program 3 iterations

Enter number to be guessed: 55
You guessed 55, and it took the program 19 iterations
```

3. (10 points) Write a function that accepts a line of text and a single letter as input and returns the number of times the letter is the first character of a word Sample runs are given below:

```
Enter your line of text: Where the mind is without fear and the head is held
high
Enter your letter to use: h
Your letter h occurs as the first letter: 3 times
```

4. (10 points) A palindrome is string that reads the same forwards and backwards. Write a Python program that reads in a string and determines whether the string is a palindrome or not. Note that a sentence that reads the same forwards and backwards by resequencing the spaces is also a palindrome and your program should consider this.
Sample runs are shown below:

```
Enter a string: mom
"mom" is a palindrome

Enter a string: apple
"apple" is not a palindrome

Enter a string: A nut for a jar of tuna
"A nut for a jar of tuna" is a palindrome

Enter a string: A nut for a jar of salmon
```

"A nut for a jar of salmon" is not a palindrome

5. (10 points) Write a program to request a file name from the user and calculate the following statistics of the contents of the file:
   - Number of lines
   - Number of words
   - Number of characters
   - Average length of a word

   In this problem use the following definitions:
   A line is a sequence of characters that end with a newline (\n) character
   A word bounded by one or more spaces (or \n) on either side of it (or both sides)
   A character is any single length string, e.g. 'a', '-', etc. but not a space (or white space)

   An example file called robertfrost.txt is included in the homework files
   <u>Sample Run</u>
   What is the filename: robertfrost.txt
   Number of lines: 4
   Number of words: 27
   Number of characters: 103
   Average length of a word: 3.8

   Note: If your file statistics are different from the answer I have given above, please explain in your notes/markdown script how you arrived at your answers. For example if you use the readlines() function then it will count the last line which does not end with a newline (\n) as a line, that is fine as long as you understand it and are able to explain.