TP2 Python

1- Write a function *displayTitle(content, width)* that displays the given content (as list of strings) centered in the indicated width and borderedby asterisks (stars).

Example: call displayTitle (["The number of DNA bases", "is huge", "", "However, not all bases are used to transmit genetic features ", "", "some are used to repair DNA", "in Elsevier, 1605,Page 4"])

- Modify the function in such a way that you process the content of a text file instead.

2- Compare the content of two text files, if they have the same content then print True, otherwise print false.

3- In statistics, a moving average (rolling average or running average) is a calculation to analyze data points by creating a series of averages of different subsets of the full data set. It is also called a moving mean or rolling mean and is a type of finite impulse response filter.

Given a series of numbers and a fixed subset size, the first element of the moving average is obtained by taking the average of the initial fixed subset of the number series. Then the subset is modified by "shifting forward"; that is, excluding the first number of the series and including the next value in the subset.

A moving average is commonly used with time series data to smooth out short-term fluctuations and highlight longer-term trends or cycles. The threshold between short-term and long-term depends on the application, and the parameters of the moving average will be set accordingly. For example, it is often used in technical analysis of financial data, like stock prices, returns or trading volumes.

Given a series of values S1, the "moving average over n values (or periods)" is a second series of values S2, in which each value is the average of n consecutive values of the initial series.

N.B. By definition, S2 will be of size len (S1) - n + 1.

It is assumed that the original series is entirely in memory, represented by a list of numbers. Calculate the list of moving averages over n periods, corresponding to the given series. It is assumed that the series has elements with k ≥ n. Example: the moving average of [2,3,5,7,11,13,17] over 3 periods gives a list of 5 values [3.333, 5, 7.666, 10.333, 13.666]. 3,333 being the average of [2,3,5], where 5 is the average of [3,5,7],etc. For example, you can use the append() method of lists to add an element at the end of the list.

4- In Python, the two main functions for getting random numbers are randint (a, b) and random (): to test the quality of the random () function, write a function computeMeanAndStdDev (n) which draws "randomly" n numbers (for example, n = 100,000) and returns the average and the standard deviation of the resulting suite. To test, write the function testRandom (n) which calls the first and displays the mean and the standard deviation, and for each of these two values, displays the absolute value of the difference between observed and expected value.

- Recall of the formulas: if n is the number of terms, S their sum and Q the sum of their squares, then the mean is m S / n and the standard deviation √Q / n m2.

- random.random() generates a random number between 0 and 1.

N.B. If the distribution of the values returned by random is uniform, when n becomes more and larger, m should tend towards 0.5 and σ towards 0.288675134595, that is to say √1/12.