

Assignment 8

Algorithms, Spring 2023

Honor code: *Work on this assignment alone or with one partner. Between different teams, collaboration is at level 1 [verbal collaboration only]. There are lots of resources online, such as animations, visualizations, practice problems, videos, and solutions— which you are encouraged to explore to deepen your understanding. However, you must be careful not to search for the specific problems in the assignment with the intent of getting hints for the solution. Searching for the assignment problems on the internet violates academic honesty for this class.*

String shuffling: A *shuffle* of two strings A and B is formed by interspersing the characters into a new string, keeping the characters from A and B in the same order.

For example, the string BANANAANANAS is a shuffle of the string BANANA and ANANAS (in several different ways, actually: BANANAANANAS, BANANAANANAS and also BANANAANANAS).

Similarly, the strings ANEVGARIN and ANEGAVRIN are both shuffles of NEVER and AGAIN.

The problem: Given three strings $A[1..m]$, $B[1..n]$ and $C[1..m+n]$, come up with an efficient algorithm to determine whether C is a shuffle of A and B . The algorithm should run in time $O(mn)$.

We expect: Answer this question in a python notebook. Your main function should have the following interface:

```
#parameters: stringA, stringB, stringC are strings
#RETURN true if stringC is a shuffle of stringA and stringB, and false otherwise
isShuffle(stringA, stringB, stringC)
```

This is the function we'll call to test your code. Think of it as a wrapper function — it must have this name, but inside it you can call other functions, with other parameters, and different names.

Evaluation: Your algorithm will be evaluated primarily on correctness but also on the quality of your code. To test correctness we'll run a number of test cases, including:

```
isShuffle(BANANA, ANANAS, BANANAANANAS) : True
isShuffle(AA, BA, AABA) : True
isShuffle(BA, AA, AABA) : True
isShuffle(A, BA, AAB) : False
```