

CSC/DSCI 2720 Data Structure

Lab 13

Due: 04/14/2023 @ 11:59PM

Requirements:

(Failure to follow the requirements will result in a score of Zero.)

1. You may use whatever IDEs / editors you like, but you must submit your responses on iCollege as **.py files**.
2. Your submissions will work exactly as required.
3. Make sure you submit a file that compiles.
4. Your submission will show an output. Should you receive a Zero for no output shown do not bother to email with “but the logic is perfect”.
5. Your program’s output must exactly match the specs (design, style) given here for each problem to pass the test cases.
6. Design refers to how well your code is written (i.e., is it clear, efficient, and elegant), while Style refers to the readability of your code (correct indentation, good variable names). Add comments to have necessary explanations for your program.
7. Add a “heading” at the very beginning of your .java files as follow:
Your Name
CSc 2720 Lab #N
Lab time: put your lab time here
Due time: put the due date here
8. *** If you used any website/online resources as reference, please cite in your comments what website did you use for studying the lab content. Also, you are supposed to make changes to the resource you use to make it your own version. Otherwise, your submission will be considered as plagiarism. ***

PROBLEM STATEMENT:

In today’s Lab you will implement a method as stated below:

Given an unsorted array, where you want to find the k-biggest element. If k is 1, we are looking for the biggest element, k is 2 would be the second biggest, and so forth. The method is defined below:

```
def kBiggest(lst, k):
```

How do you solve this problem **without using a sorting algorithm** but instead using a data structure? Heap might be a good choice of doing it, but it might have different approaches. Please write an algorithm that the time complexity will be in $O(n \log k)$. Please also write a

paragraph of analysis of the time and space complexity for this approach in the comment. You are allowed to use Python built-in class for Heaps.

Very Very Important:

1. Your code should be well commented which explains all the steps you are performing to solve the problem. **A submission without code comments will immediately be deducted 15 points!**
2. As a comment in your code, please write your test-cases on how you would test your solution assumptions and hence your code.
A submission without test cases (as comments) will immediately be deducted 15 points!
Please Remember: Although, written as comments - You will address your test cases in the form of code and not prose :)