

## Assignment 2. Due Date: Sunday June 15, 11:50 pm.

### Notes

- Use python3 only.
- Fill in the given templates.
- Comment your code clearly.
- Each question carries 4 marks.

### 1 Third largest number

Write a function `third_largest` that returns the third largest number in an unsorted list. Your function take care of duplicates appropriately. For instance, if the input list is `[23, 13, 23, 2, 4, 3, 23, 1]`, your function should return 23. Your function should run in time complexity  $O(n)$ ,  $n$  being the size of the input list. **Note that you are not allowed to use any built-in functions over lists.**

```
# Returns the third largest integer in input_list.
def third_largest(input_list):
    # Write your code here and return the correct value.
```

**Food for thought:** Can you think of an efficient way to find the  $k^{th}$  (for a given value of  $k$ ) largest number in an unsorted list? Note that this is only food for thought and does not carry an extra marks.

### 2 Binary search

A list is strictly convex if its elements first strictly decrease and then strictly increase. The smallest element in a strictly convex list is called the minima of the list. Write a function `find_minima` that accepts a strictly convex list and returns its minima. Your program should run in time complexity  $O(\log(n))$ ,  $n$  being the size of the list. **As before, you are not allowed to use any built-in functions over lists.**

```
# Returns the minima of a convex list.
def find_minima(input_list):
    # Write your code here
```

**Sample list:** `[15,13,12,10,7,6,5,8,11,20,26]`

**Expected output:** 5

### 3 CSV parsing

CSV is a text file format for storing tabular data. Each row is written on a separate line and columns are separated by commas. Given a CSV file where each row contains the name followed by the subject-wise marks of a student, write a function that prints out the name and the average score for each of the students. You can assume that each student appears in the same number of subjects.

```
# Computes the average marks.
def compute_average(filename):
    with open(filename) as file:
        for line in file:
            # Write your code here.
```

#### Sample file contents

```
Anita,87,81,79,83,89
Akhil,65,84,93,82,71
Dhruv,78,82,86,91,77
```

#### Expected output

```
Anita: 83.8
Akhil: 79.0
Dhruv: 82.8
```

**Hint:** You can use `.split()` method on a string to get a list of its parts. Eg: `"A:B:C:D".split(":")` gives you the list `["A", "B", "C", "D"]`.

### Testing your code

You may use the snippets below to test your code.

```
numbers = [2,1,4,8,6,3,5]
third_largest_number = third_largest(numbers)
print("The third largest number in", numbers, " is", third_largest_number)
#=> The third largest number in [2,1,4,8,6,3,5] is 5
```

```
input_list = [15,13,12,10,7,6,5,8,11,20,26]
minima = find_minima(input_list)
print("The minima of the list", input_list, "is", minima)
#=> The minima of the list [15,13,12,10,7,6,5,8,11,20,26] is 5
```

```
marks = "marks.csv"
compute_average(marks)
# All printing happens inside the function itself.
```