Assignment - 1

Topics:

1. **Time complexity**
2. **Space complexity**
3. **Array**
4. **Matrix**

(Maximum marks - 15)

Q - 1) Write a program to find the upper bound (first occurrence's index) of a target given by the user, that should be present in the list. Using linear search.

eg:

A= [1,1,1,2,2,2,3,3,4]

lower bound of 2 = 3

upper bound of 2 = 5

Your code should return 5.

Write time and space complexity of your code.

(3 marks)

Q - 2) Solve question 1 , but use binary search search.

Write time and space complexity of your code.

(3 marks)

Q - 3) Find largest number in a list, and second largest number, (without using inbuilt functions).

eg:

A = [1,3,4,5,8,1,2,3,4,9,6,9]

return 9 and 8.

Write time and space complexity of your code.

(3 marks)

Q - 4) Check If N and Its Double Exist:
https://leetcode.com/problems/check-if-n-and-its-double-exist/

Given an array `arr` of integers, check if there exists two integers `N` and `M` such that `N` is the double of `M` (i.e. `N = 2 * M`).

More formally check if there exists two indices `i` and `j` such that :

- `i != j`
- `0 <= i, j < arr.length`
- `arr[i] == 2 * arr[j]`

Example :

Input: arr = [10,2,5,3]
Output: true
Explanation: N = 10 is the double of M = 5,that is, 10 = 2 * 5.

Write time and space complexity of your code.
(3 marks)

Q - 5) Intersection of Two Arrays II

https://leetcode.com/problems/intersection-of-two-arrays-ii/

Given two integer arrays `nums1` and `nums2`, return *an array of their intersection*. Each element in the result must appear as many times as it shows in both arrays and you may return the result in any order.

Example:

Input: nums1 = [1,2,2,1], nums2 = [2,2]
Output: [2,2]

Write time and space complexity of your code.
(3 marks)

Q- 6) [BONUS QUESTION] **(5 marks)**
Solve question 5, but within O(nlogn) time complexity.

Marks distribution:
Question 1,2,3,4 and 5 carry 3 marks each.

Question 6 is a bonus question, that means if you leave that question you don't lose a mark, but if you solve it, you can extra 5 marks.

Remark: maximum marks you can get is 15, bonus question helps only if you are not able to solve another question.
Remark 2: If question 5 and 6 both are of O(nlogn) time complexity, award marks in both.