**Assignment – 3**

Q1. Given an integer array nums of length n and an integer target, find three integers in nums such that the sum is closest to the target. Return the sum of the three integers. You may assume that each input would have exactly one solution. **Example 1:** Input: nums = [-1,2,1,-4], target = 1 Output: 2 **Explanation:** The sum that is closest to the target is 2. (-1 + 2 + 1 = 2).

Sol.

def threeSumClosest(nums, target):

nums.sort()

n = len(nums)

closest\_sum = float('inf')

for i in range(n-2):

left = i + 1

right = n - 1

while left < right:

current\_sum = nums[i] + nums[left] + nums[right]

if abs(current\_sum - target) < abs(closest\_sum - target):

closest\_sum = current\_sum

if current\_sum < target:

left += 1

elif current\_sum > target:

right -= 1

else:

return target

return closest\_sum

Q2. Given an array nums of n integers, return an array of all the unique quadruplets [nums[a], nums[b], nums[c], nums[d]] such that: ● 0 <= a, b, c, d < n ● a, b, c, and d are distinct. ● nums[a] + nums[b] + nums[c] + nums[d] == target You may return the answer in any order. **Example 1:** Input: nums = [1,0,-1,0,-2,2], target = 0 Output: [[-2,-1,1,2],[-2,0,0,2],[-1,0,0,1]]

Sol.

def fourSum(nums, target):

nums.sort()

n = len(nums)

result = []

for i in range(n-3):

if i > 0 and nums[i] == nums[i-1]:

continue

for j in range(i+1, n-2):

if j > i+1 and nums[j] == nums[j-1]:

continue

left = j + 1

right = n - 1

while left < right:

current\_sum = nums[i] + nums[j] + nums[left] + nums[right]

if current\_sum == target:

result.append([nums[i], nums[j], nums[left], nums[right]])

while left < right and nums[left] == nums[left+1]:

left += 1

while left < right and nums[right] == nums[right-1]:

right -= 1

left += 1

right -= 1

elif current\_sum < target:

left += 1

else:

right -= 1

return result

Q3. A permutation of an array of integers is an arrangement of its members into a sequence or linear order.

For example, for arr = [1,2,3], the following are all the permutations of arr: [1,2,3], [1,3,2], [2, 1, 3], [2, 3, 1], [3,1,2], [3,2,1].

The next permutation of an array of integers is the next lexicographically greater permutation of its integer. More formally, if all the permutations of the array are sorted in one container according to their lexicographical order, then the next permutation of that array is the permutation that follows it in the sorted container.

If such an arrangement is not possible, the array must be rearranged as the lowest possible order (i.e., sorted in ascending order).

● For example, the next permutation of arr = [1,2,3] is [1,3,2]. ● Similarly, the next permutation of arr = [2,3,1] is [3,1,2]. ● While the next permutation of arr = [3,2,1] is [1,2,3] because [3,2,1] does not have a lexicographical larger rearrangement.

Given an array of integers nums, find the next permutation of nums. The replacement must be in place and use only constant extra memory.

**Example 1:** Input: nums = [1,2,3] Output: [1,3,2]

Sol.

def nextPermutation(nums):

n = len(nums)

i = n - 2

# Find the first decreasing element from right to left

while i >= 0 and nums[i] >= nums[i + 1]:

i -= 1

if i >= 0:

j = n - 1

# Find the smallest element greater than nums[i]

while j >= 0 and nums[j] <= nums[i]:

j -= 1

# Swap nums[i] and nums[j]

nums[i], nums[j] = nums[j], nums[i]

# Reverse the subarray from i+1 to the end

left = i + 1

right = n - 1

while left < right:

nums[left], nums[right] = nums[right], nums[left]

left += 1

right -= 1

Q4. **Question 4** Given a sorted array of distinct integers and a target value, return the index if the target is found. If not, return the index where it would be if it were inserted in order. You must write an algorithm with O(log n) runtime complexity. **Example 1:** Input: nums = [1,3,5,6], target = 5 Output: 2

Sol.

def searchInsert(nums, target):

left = 0

right = len(nums) - 1

while left <= right:

mid = left + (right - left) // 2

if nums[mid] == target:

return mid

elif nums[mid] < target:

left = mid + 1

else:

right = mid - 1

return left

Q5. You are given a large integer represented as an integer array digits, where each digits[i] is the ith digit of the integer. The digits are ordered from most significant to least significant in left-to-right order. The large integer does not contain any leading 0's.

Increment the large integer by one and return the resulting array of digits.

**Example 1:** Input: digits = [1,2,3] Output: [1,2,4]

**Explanation:** The array represents the integer 123. Incrementing by one gives 123 + 1 = 124. Thus, the result should be [1,2,4]

Sol.

def plusOne(digits):

carry = 1

n = len(digits)

for i in range(n-1, -1, -1):

digits[i] += carry

if digits[i] == 10:

digits[i] = 0

carry = 1

else:

carry = 0

break

if carry == 1:

digits.insert(0, 1)

return digits