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ASSIGNMENT DSA  
QUIZ 1

**Question One - Remove Duplicates from Sorted Array**

Function:

int removeDuplicates(vector<int>& nums) {

if (nums.empty()) return 0;

int index = 0;

for (int i = 1; i < nums.size(); i++) {

if (nums[i] != nums[index]) {

index++;

nums[index] = nums[i];

}

}

return index + 1;

}

Explanation:

We iterate through the array, checking for duplicates.

When a non-duplicate element is found, it's moved to the 'index' position.

The variable 'index' tracks the position where the next unique element should be placed.

This approach modifies the array in-place and uses O(1) extra memory.

**Question Two - Rotate Array**

Function:

void rotate(vector<int>& nums, int k) {

k = k % nums.size(); // To handle rotation larger than the array size

reverse(nums.begin(), nums.end());

reverse(nums.begin(), nums.begin() + k);

reverse(nums.begin() + k, nums.end());

}

Explanation:

The array is first reversed.

The first 'k' elements are reversed.

The remaining 'n-k' elements are reversed.

This is an in-place operation with O(1) extra space.

**Question Three - Contains Duplicate**

Function:

bool containsDuplicate(vector<int>& nums) {

unordered\_set<int> numSet;

for (int num : nums) {

if (numSet.find(num) != numSet.end()) {

return true;

}

numSet.insert(num);

}

return false;

}

Explanation:

We use a hash set to track seen numbers.

If a number is already in the set, we have a duplicate.

This solution is efficient in terms of time complexity.

**Question Four - Single Number**

Function:

int singleNumber(vector<int>& nums) {

int result = 0;

for (int num : nums) {

result ^= num;

}

return result;

}

Explanation:

XOR of all elements gives us the number with a single occurrence.

This is because a^a = 0, and a^0 = a. Therefore, all paired elements will cancel each other out leaving the single number.

This approach is efficient and uses O(1) space.

These solutions address the key aspects of the quiz: efficient problem-solving and minimizing extra space usage. They are also in line with the hints provided, focusing on simplicity and gradual refinement.