EXTRA PROBLEMS

(5) MAJORITY ELEMENT

```
def majorityElement(nums):
  # Initialize variables for the candidate and the count
  candidate = None
  count = 0

  # Phase 1: Find the candidate
  for num in nums:
      if count == 0:
          candidate = num

      if num == candidate:
          count += 1
      else:
          count -= 1

  # The candidate is the majority element
  return candidate

# Example usage:
nums1 = [2, 2, 1, 1, 1, 1, 2, 2]
print(majorityElement(nums1))  # Output: 2

nums2 = [3, 2, 4]
print(majorityElement(nums2))  # Output: 3

nums3 = [6, 5, 7]
print(majorityElement(nums3))  # Output: 5
```

(6) MEREGE TWO SORTED ARRAYS IN FIRST ARRAY

```
def mergetwosortedarrays(nums1, m, nums2, n):
    p1 = m - 1
    p2 = n - 1
    p = m + n - 1

    while p1 >= 0 and p2 >= 0:
      if nums1[p1] > nums2[p2]:
          nums1[p] = nums1[p1]
          p1 -= 1
      else:
          nums1[p] = nums2[p2]
          p2 -= 1
```

```
      p -= 1

    while p2 >= 0:
        nums1[p] = nums2[p]
        p2 -= 1
        p -= 1

nums1 = [3, 2, 3, 0, 0, 0]
m = 3
nums2 = [2, 5, 6]
n = 3
mergetwosortedarrays(nums1, m, nums2, n)
print(nums1)
```

(7) REMOVE DUPLICATES FROM SORTED ARRAYS

```
def removeduplicates(numbers):
    if not numbers:
        return 0

    i = 0
    for j in range(1, len(numbers)):
        if numbers[j] != numbers[i]:
            i += 1
            numbers[i] = numbers[j]


    return i + 1

numbers = [1, 1, 2, 3, 3, 4, 4, 5, 5, 5]
k = removeduplicates(numbers)
print(numbers[:k])
print(numbers[k:])
```

(8) REMOVE ELEMENT

```
def remove(nums,val):
    j = 0
    for i in range(len(nums)):
        if nums[i] != val:
            nums[j] = nums[i]
            j += 1

    return j
```

```
nums = [3,2,2,3]
val = 2
new_length = remove(nums, val)
print(new_length)  # New length of the list
print(nums[:new_length])
```

(9) SORT COLOURS

```
def sortcolors(nums):
    l, m, h = 0, 0, len(nums) - 1
    while m <= h:
        if nums[m] == 0:
            nums[l], nums[m] = nums[m], nums[l]
            l += 1
            m += 1

        elif nums[m] == 1:
            m += 1

        else:
            nums[m], nums[h] = nums[h], nums[m]
            h -= 1



    return nums

nums = [2,0,2,1,1,0]
print(sortcolors(nums))
```