

Arrays

- Concatenation of Array

```
class Solution {
    public int[] getConcatenation(int[] nums) {
        int n=nums.length;
        int[] ans=new int[n*2];
        for(int i=0;i<n*2;i++)
        {
            int x=i%n;
            ans[i]=nums[x];
        }
        return ans;
    }
}
```

- Contains duplicate

```
class Solution {
    public boolean hasDuplicate(int[] nums) {
        Arrays.sort(nums);
        for(int i=0;i<nums.length-1;i++)
        {
            if(nums[i]==nums[i+1])
            {
                return true;
            }
        }
        return false;
    }
}
```

Or

```

class Solution {
    public boolean hasDuplicate(int[] nums) {
        Set<Integer> s = new HashSet<>();    // Using hashset
        for (int i : nums)
        {
            if(s.add(i)==false) // returns false when duplicate elements are
present
                return true;
        }
        return false;
    }
}

```

- Valid anagram

```

class Solution {
    public boolean isAnagram(String s, String t) {

        if(s.length() != t.length())
            return false;

        HashMap<Character,Integer> map1=new HashMap<>();
        HashMap<Character,Integer> map2=new HashMap<>();

        for(int i=0;i<s.length();i++)
        {
            char ch=s.charAt(i);
            char ch1=t.charAt(i);
            map1.put(ch,map1.getOrDefault(ch,0)+1);
            map2.put(ch1,map2.getOrDefault(ch1,0)+1);
        }

        for (Character key : map1.keySet())
        {
            if (!map1.get(key).equals(map2.get(key)))
                return false;
        }
        return true;
    }
}

```

```
}  
}
```

Or

```
class Solution {  
    public boolean isAnagram(String s, String t) {  
        if(s.length() != t.length())  
            return false;  
  
        HashMap<Character,Integer> map=new HashMap<>();  
  
        for(int i=0;i<s.length();i++)  
        {  
            char ch=s.charAt(i);  
            map.put(ch,map.getOrDefault(ch,0)+1);  
        }  
  
        for(char c : t.toCharArray())  
        {  
            if(map.containsKey(c)==false)  
                return false;  
            map.put(c,map.get(c)-1);  
            if(map.get(c)==0)  
                map.remove(c);  
        }  
        return map.isEmpty();  
    }  
}
```

Or

```
class Solution {  
    public boolean isAnagram(String s, String t) {  
        if(s.length() != t.length())
```

```

        return false;

        char[] ss=s.toCharArray();
        char[] tt=t.toCharArray();
        Arrays.sort(ss);
        Arrays.sort(tt);
        return Arrays.equals(ss,tt);
    }
}

```

- Two sum

```

class Solution {
    public int[] twoSum(int[] nums, int target) {

        HashMap<Integer,Integer> map=new HashMap<>();
        int[] arr=new int[2];

        for(int i=0;i<nums.length;i++)
        {
            int x=target-nums[i];
            if(map.containsKey(x))
            {
                arr[0]=map.get(x);
                arr[1]=i;
                break;
            }
            map.put(nums[i],i);
        }
        return arr;
    }
}

```

- Longest common prefix

```

class Solution {
    public String longestCommonPrefix(String[] strs) {

        if(strs.length==0)
            return "";
        else if(strs.length==1)
            return strs[0];

        String w=strs[0]; // Storing first string as initial prefix
        int l=w.length(),f=0; // flag

        while(!w.equals("")) // until w!="
        {
            f=0; // resetting flag each time

            for(int i=1;i<strs.length;i++)
            {
                if(strs[i].length()<w.length()) // checking if current string is
smaller than the prefix
                {
                    f=1;
                    break;
                }

                String wd=strs[i].substring(0,w.length());

                if(!w.equals(wd))
                {
                    f=1;
                    break;
                }
            }

            if(f==0) // if flag stays 0 it means prefix is common in all
strings
                return w;

            if(w.length()==0) // if the length of prefix is 0 we break to avoid
substring error
                break;
        }
    }
}

```

```

        w=strs[0].substring(0,l--);
    }

    return "";
}
}

```

- Group anagrams

```

class Solution {
    public List<List<String>> groupAnagrams(String[] strs) {

        if(strs==null || strs.length==0)
            return new ArrayList<>();

        HashMap<String,List<String>> map=new HashMap<>();

        for(String s: strs)
        {
            char[] c = s.toCharArray(); // converting string to character array
            Arrays.sort(c); // sorting anagrams give common string
            String wd=new String(c);    // reverting back to string

            if(!map.containsKey(wd))    // searching if the common strings is
present if not a list is created for it
                map.put(wd,new ArrayList<>());

            map.get(wd).add(s); // adding anagrams in the key's list
        }

        return new ArrayList<>(map.values());
    }
}

```

- Remove element

```

class Solution {
    public int removeElement(int[] nums, int val) {

        int i=0,j=nums.length-1;

        while(i<=j)
        {
            if(nums[i]==val)
            {
                if(nums[j]!=val)
                {
                    int t=nums[i];
                    nums[i]=nums[j];
                    nums[j]=t;
                    i++;
                }
                j--;
            }
            else
                i++;
        }
        return j+1;
    }
}

```

Or

```

class Solution {
    public int removeElement(int[] nums, int val) {

        int k=0;

        for(int i=0;i<nums.length;i++)
        {
            if(nums[i]!=val)
                nums[k++]=nums[i];
        }
    }
}

```

```
        return k;
    }
}
```

Or

```
class Solution {
    public int removeElement(int[] nums, int val) {

        int k=0;
        ArrayList<Integer> list=new ArrayList<>();

        for(int i: nums)
        {
            if(i!=val)
                list.add(i);
        }

        for(int i=0;i<list.size();i++)
        {
            nums[i]=list.get(i);
        }
        return list.size();
    }
}
```

- Majority element

```
class Solution {
    public int majorityElement(int[] nums) {

        HashMap<Integer,Integer> map=new HashMap<>();

        for(int i: nums)
            map.put(i,map.getOrDefault(i,0)+1);

        int max=-1,val=Integer.MIN_VALUE;
```



```

        for(int i: map.keySet())
        {
            if(map.get(i)>max)
            {
                max=map.get(i);
                val=i;
            }
        }

        return val;
    }
}

```

Or

```

public class Solution {
    public int majorityElement(int[] nums) {
        Arrays.sort(nums);
        return nums[nums.length / 2];
    }
}

```

Or

```

public class Solution {
    public int majorityElement(int[] nums) {

        int candidate=0,count=0;    // Moore voting algorithm

        for(int i: nums)
        {
            if(count==0)
                candidate=i;
            count=count+((i==candidate)? 1 : -1);
        }
    }
}

```

```

        return candidate;
    }
}

```

- Design hashset

```

class MyHashSet {

    ArrayList<Integer> list;    // accessible arraylist

    public MyHashSet() {
        list=new ArrayList<>(); // created the list
    }

    public void add(int key) {
        if(!list.contains(key))
            list.add(key);
    }

    public void remove(int key) {
        list.remove(Integer.valueOf(key)); // otherwise it treats key as an index
    }

    public boolean contains(int key) {
        return list.contains(key);
    }
}

```

Or

```

public class MyHashSet {
    private boolean[] data;

    public MyHashSet() {
        data = new boolean[1000001];
    }
}

```

```

    }

    public void add(int key) {
        data[key] = true;
    }

    public void remove(int key) {
        data[key] = false;
    }

    public boolean contains(int key) {
        return data[key];
    }
}

```

- Design HashMap

```

class MyHashMap {

    int[] arr;

    public MyHashMap() {
        arr=new int[1000001];
        Arrays.fill(arr,-1);
    }

    public void put(int key, int value) {
        arr[key]=value;
    }

    public int get(int key) {
        return arr[key];
    }

    public void remove(int key) {
        arr[key]=-1;
    }
}

```

- Sort an array

```
class Solution {
    public int[] sortArray(int[] nums) {
        int l=nums.length;
        mergesort(nums,0,l-1);
        return nums;
    }

    static void mergesort(int[] arr,int l, int r)
    {
        if(l>=r)
            return;

        int mid=(l+r)/2;
        mergesort(arr,l,mid);
        mergesort(arr,mid+1,r);
        merge(arr,l,mid,r);
    }

    static void merge(int[] arr,int l,int mid,int r)
    {
        int n1,n2;
        n1=mid-l+1;
        n2=r-mid;

        int a[]=new int[n1];
        int b[]=new int[n2];

        for(int i=0;i<n1;i++)
            a[i]=arr[l+i];

        for(int i=0;i<n2;i++)
            b[i]=arr[mid+i+1];

        int i=0,j=0,k=l;

        while(i<n1 && j<n2)
        {
            if(a[i]<b[j])
```

```

        arr[k++]=a[i++];
    else
        arr[k++]=b[j++];
}

while(i<n1)
    arr[k++]=a[i++];
while(j<n2)
    arr[k++]=b[j++];
}
}

```

- Sort colors

```

class Solution {
    public void sortColors(int[] nums) {
        int r=0,w=0,b=nums.length-1;    // 3 pointers

        while(w<=b)
        {
            if(nums[w]==0)    // 0 always left
            {
                int temp=nums[w];
                nums[w]=nums[r];
                nums[r]=temp;
                w++;
                r++;
            }
            else if(nums[w]==1) // 1 always mid
                w++;
            else    // 2 always right
            {
                int temp=nums[w];
                nums[w]=nums[b];
                nums[b]=temp;
                b--;
            }
        }
    }
}

```

```
}  
}
```

- Top K frequent elements

```
class Solution {  
    public int[] topKFrequent(int[] nums, int k) {  
        HashMap<Integer,Integer> map=new HashMap<>();  
        for(int i:nums)  
        {  
            map.put(i,map.getOrDefault(i,0)+1);  
        }  
  
        int[] n=new int[map.size()];  
        int a=0;  
  
        for(int i:map.keySet())  
        {  
            n[a++]=map.get(i);  
        }  
  
        Arrays.sort(n);  
  
        a=n.length-k;  
        int[] ans=new int[k];  
        int x=0;  
  
        for(int i=a;i<n.length;i++)  
        {  
            for(int j:map.keySet())  
            {  
                if(map.get(j)==n[i])  
                {  
                    ans[x++]=j;  
                    map.remove(j);  
                    break;  
                }  
            }  
        }  
    }  
}
```

```

        return ans;
    }
}

```

Or

```

class Solution {
    public int[] topKFrequent(int[] nums, int k) {

        // Step 1: Count frequency of each number using HashMap
        HashMap<Integer, Integer> map = new HashMap<>();
        for (int i : nums) {
            map.put(i, map.getOrDefault(i, 0) + 1);
        }

        // Step 2: Create buckets where index = frequency
        // Each bucket[i] holds a list of numbers that appear exactly i times
        ArrayList<Integer>[] bucket = new ArrayList[nums.length + 1];

        // Step 3: Fill buckets based on frequency
        for (int key : map.keySet()) {
            int freq = map.get(key);
            if (bucket[freq] == null) {
                bucket[freq] = new ArrayList<>();
            }
            bucket[freq].add(key);
        }

        // Step 4: Collect top K frequent elements starting from highest
        // frequency
        List<Integer> res = new ArrayList<>();
        for (int i = bucket.length - 1; i >= 0 && res.size() < k; i--) {
            if (bucket[i] != null)
                res.addAll(bucket[i]); // Add all numbers with this frequency
        }
    }
}

```

```

        // Step [5]: Convert result list to int[] for the final answer
        int[] ans = new int[k];
        for (int i = 0; i < k; i++)
            ans[i] = res.get(i);

        return ans; // [X] O(n) overall time complexity
    }
}

```

- Encode and Decode strings

```

class Solution {

    public String encode(List<String> strs) {
        String wd="";
        for(String s:strs)
        {
            wd+=s+"/";
        }
        return wd;
    }

    public List<String> decode(String str) {
        ArrayList<String> wd=new ArrayList<>();
        String w="";
        for(int i=0;i<str.length();i++)
        {
            char ch=str.charAt(i);
            if(ch!='/')
                w+=ch;
            else
            {
                wd.add(w);
                w="";
            }
        }
        return wd;
    }
}

```



```
}
```

Or

```
class Solution {

    public String encode(List<String> strs) {
        StringBuilder sb = new StringBuilder();
        for (String s : strs) {
            sb.append(s.length()).append('#').append(s);
        }
        return sb.toString();
    }

    public List<String> decode(String str) {
        List<String> result = new ArrayList<>();
        int i = 0;
        while (i < str.length()) {
            int j = i;
            while (str.charAt(j) != '#') j++;
            int len = Integer.parseInt(str.substring(i, j));
            j++;
            result.add(str.substring(j, j + len));
            i = j + len;
        }
        return result;
    }

}
```

- Range sum query 2d immutable

```
class NumMatrix {
```

```

int[][] matrix;

public NumMatrix(int[][] matrix) {
    this.matrix=matrix;;
}

public int sumRegion(int row1, int col1, int row2, int col2) {
    int sum=0;
    for(int i=row1;i<=row2;i++)
    {
        for(int j=col1;j<=col2;j++)
        {
            sum+=matrix[i][j];
        }
    }
    return sum;
}
}

```

Or

```

class NumMatrix {

    int [][] prefix;
    public NumMatrix(int[][] matrix) {
        int r=matrix.length,c=matrix[0].length;
        prefix=new int[r+1][c+1];
        for(int i=1;i<=r;i++)
        {
            for(int j=1;j<=c;j++)
            {
                prefix[i][j]=matrix[i-1][j-1]
                    +prefix[i-1][j]
                    +prefix[i][j-1]
                    -prefix[i-1][j-1];
            }
        }
    }
}

```

```

public int sumRegion(int row1, int col1, int row2, int col2) {
    return prefix[row2+1][col2+1]
        - prefix[row1][col2 + 1]
        - prefix[row2 + 1][col1]
        + prefix[row1][col1];
}
}

```

- Products of arrays except self

```

class Solution {
    public int[] productExceptSelf(int[] nums) {
        int p=1,zero=0;
        for(int i:nums)
        {
            if(i!=0)
                p*=i;
            else
                zero++;
        }

        for(int i=0;i<nums.length;i++)
        {
            if(zero>1)
                nums[i]=0;
            else if(zero==1)
                nums[i]=(nums[i]==0) ? p : 0;
            else
                nums[i]=p/nums[i];
        }

        return nums;
    }
}

```

