1. Explore more applications of Catalan numbers.
   (Hint: Grid, Dynamic Programming, Parenthesis)

   Programming Language: Java
   Code by Chinmai:

```java
class Solution {
    public int numTrees(int n) {
        //base case condition
        if(n==0 || n==1)
        return 1;
        int sum=0,i=0,j=n-1;
        while(i<=n-1 && j>= 0){
            sum += numTrees(i)*numTrees(j);
            i++;
            j--;
        }
        return sum;

    }
}
```

   Code with Memoization Approach:

```
public Map<Integer,Integer> hash = new Hashtable<>();
   public int numTrees(int n) {
     // memoization is working
      if(hash.get(n) != null)
        return hash.get(n);
     // Base case condition
      if(n==0 || n==1)
      return 1;

      int sum=0,i=0,j=n-1;

      while(i<=n-1 && j>= 0){
         sum += numTrees(i)*numTrees(j);
         i++;
         j--;
      }
     //storage corresponding to n is happening
      hash.put(n,sum);
      return sum;
   }
```

Count Sort by Ankan:

```
function countingSort(arr) {
  const countingArray = new Array(arr.length + 1);

  for(let i=0; i<countingArray.length; i++){
    countingArray[i] = 0;
  }

  for(let num of arr){
    countingArray[num] += 1;
  }

  for(let i=1;i<countingArray.length;i++){
    countingArray[i] += countingArray[i-1];
  }

  const sortedArray = new Array(arr.length);

  for(let unsortedArrayPos=arr.length-1; unsortedArrayPos>=0; unsortedArrayPos--){
    const sortedArrayPos = countingArray[arr[unsortedArrayPos]];
    countingArray[arr[unsortedArrayPos]] -= 1;

    sortedArray[sortedArrayPos - 1] = arr[unsortedArrayPos];
  }

  return sortedArray;
}

console.log(countingSort([1,4,1,2,7,5,2]));
```