Sum using postions

```
Algorthim sumHelper(L,p)
 If L.isLast(p) then          1
       return p.element;     1
   s:=sumHelper(L,L.after(p)).   n
return s+p.element();           n
O(n)

Algorthim sum(L)
 If(L.isEmpty())  then return 0.      1
 return sumHelper(L,L.first());       1
```

This is Big O of O(n)

```
/** sum using postion traversal Js code*/
function sum(L){
    return sumHelper(L,L.first())
}
function sumHelper(L,p){
    if(L.isLast(p)) return p.element()
    return
p.element()+sumHelper(L,L.after(p))
}
```

Sum Using Rank

Algortim sumHelper(L,i).	Sequnce	List
If L.size()==i then return 0.	1	1
return L.elemAtRank(i)+ sumHelper(L,i=i+1)	n	n(n+1)/2

Algorthim sum(L).		
If(L.size()===0) return 0;	1	1
Return sumHelper(L,0)	1	1

Big O of this using Sequnce is O(n)
Big O of this using List is O(n2)

```
/** sum using rank traversal Js code*/
function sum(L){
    if(L.size()===0) return 0;
    return sumHelper(L,0)
}
function sumHelper(L,i){
    if(i==L.size()) return 0
    return
L.elemAtRank(i)+sumHelper(L,i=i+1)
}
```

Find maximum using postion

Algorthim findMaxHelper(L,p,max)
    if L.isLast(p) then return max. 1
   else if (p.element()>max). 1
        max=p.element(). 1
 return findMaxHelper(L,L.after(p),max). n

Algorthim findMax(L).
  p:=L.first() 1
  return findMaxHelper(L,L.after(p),p.element() 1

```
/** Find maximum using postion */
 function findMax(L){
     let p=L.first()
    return findMaxHelper(L,L.after(p),p.element())
 }
 function findMaxHelper(L,p,max){
    if(L.isLast(p)) return max
    else if(p.element()>max)
          max=p.element();
    return findMaxHelper(L,L.after(p),max)
 }
```

Find maximum using rank

Algorthim finsMaxHelper(L,I,max).	Sequnce	List
if(i===L.size()) return max.	1.	1
else if max<L.elemAtRank(i)	1	1
max:=L.elmAtRAnk(i)	n	n(n+1)/2
return finsMaxHelper(L,i=i+1;max)	n	n

Algorthim findMax(L)		
If L.size()===0 throw Error("empty list")	1	1
Return finsMaxHelper(L,1,L.elemAtRank(0)).	1	1

Big O of findMAx using sequnce O(n)
Big O of findMAx using List O(n2)

```
/** Find maximum using Rank  Js code*/
function findMax(L){
    if(L.size()===0) throw Error("empty list")
    return findMaxHelper(L,1,L.elemAtRank(0))
}
function findMaxHelper(L,i,max){
    if(i===L.size())
        return max
     else if(max<L.elemAtRank(i))
        max=L.elemAtRank(i)
     return findMaxHelper(L,i=i+1,max)
    }
```

Algorthim sub subSetHelper(n,set,subset,start)

Set.push(subset)	n
For(let i=start;i<=n;i++)	n
subset.push(i)	
subSetHelper(n,set,subset,start=start+1)	n*2^n
subset.pop()	n

Algorthim subOfSubSet(L)

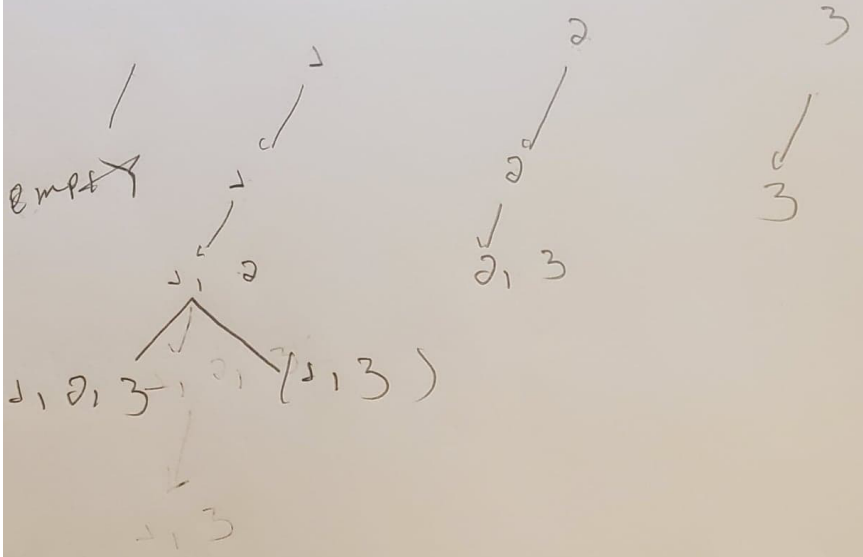
set:=[];	1
subset:=[]	1
subSetHelper(n,set,subset,1)	1
return set	1

over all Big o of this is O(n*2^n)

```
function setOfSubsets(n) {
  let set = [];
  let subSet = [];
  subSetHelper(n, set, subSet, 1);
  return set;
}
function subSetHelper(n, set, subSet, start) {
  set.push(subSet);
  for (let i = start; i <= n; i++) {
    subSet.push(i);
    subSetHelper(n, set, subSet, start+=1);
    subSet.pop();
  }
}
```

for example

subset [3]



empty, [1], [1, 2], [1, 2, 3], [1, 3], [2]

[2, 3], [3]

Total - 8 - subsets for n = 3

So that for n we have 2^n subsets