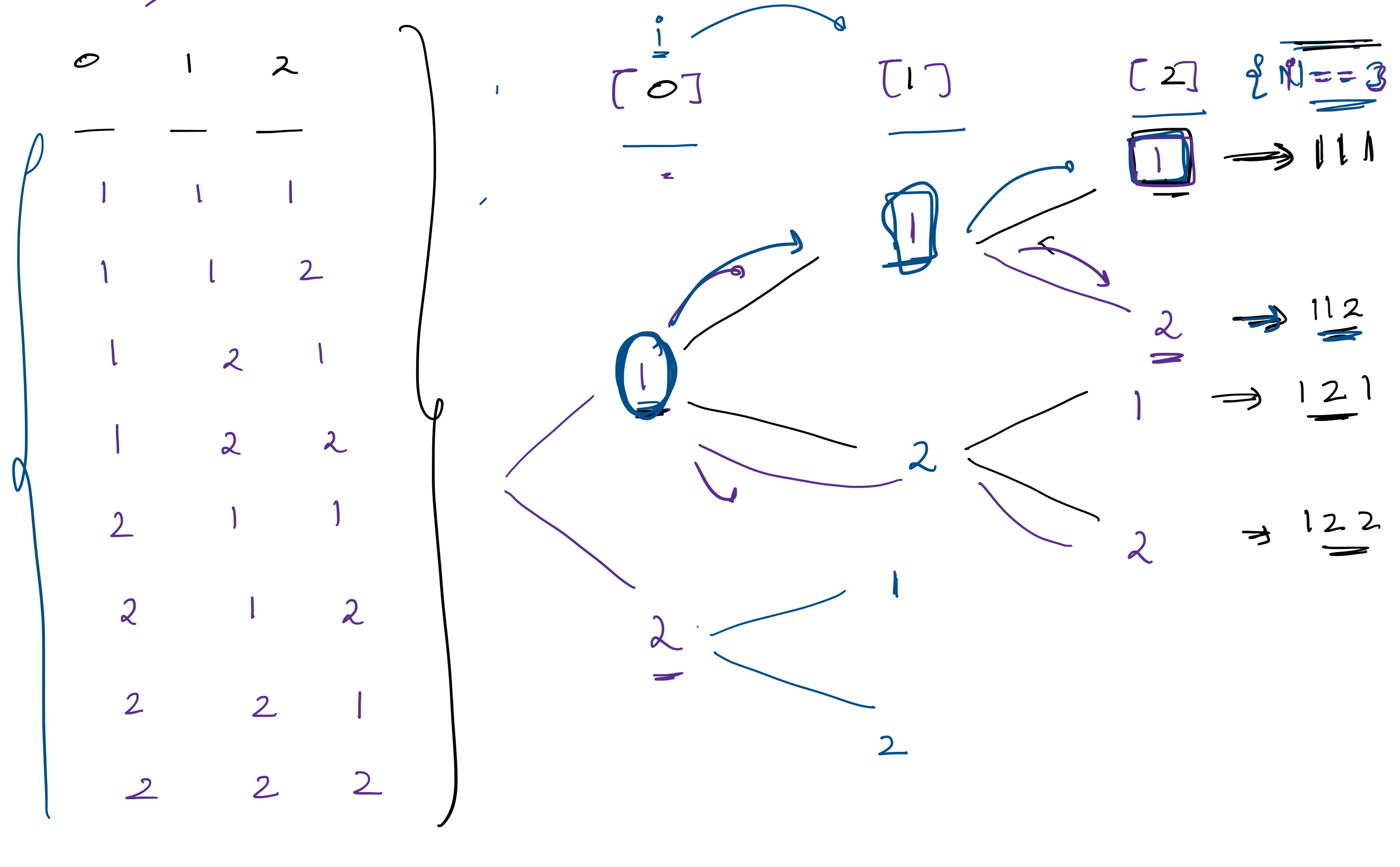


Basic Backtracking

↳ All permutations/Combinations using recursion
Solutions

1) Q) $N=3$, (Generate all 3 digit numbers, C_2^N in increasing order)



Parameters:

$arr[], i, N$

Function calls:

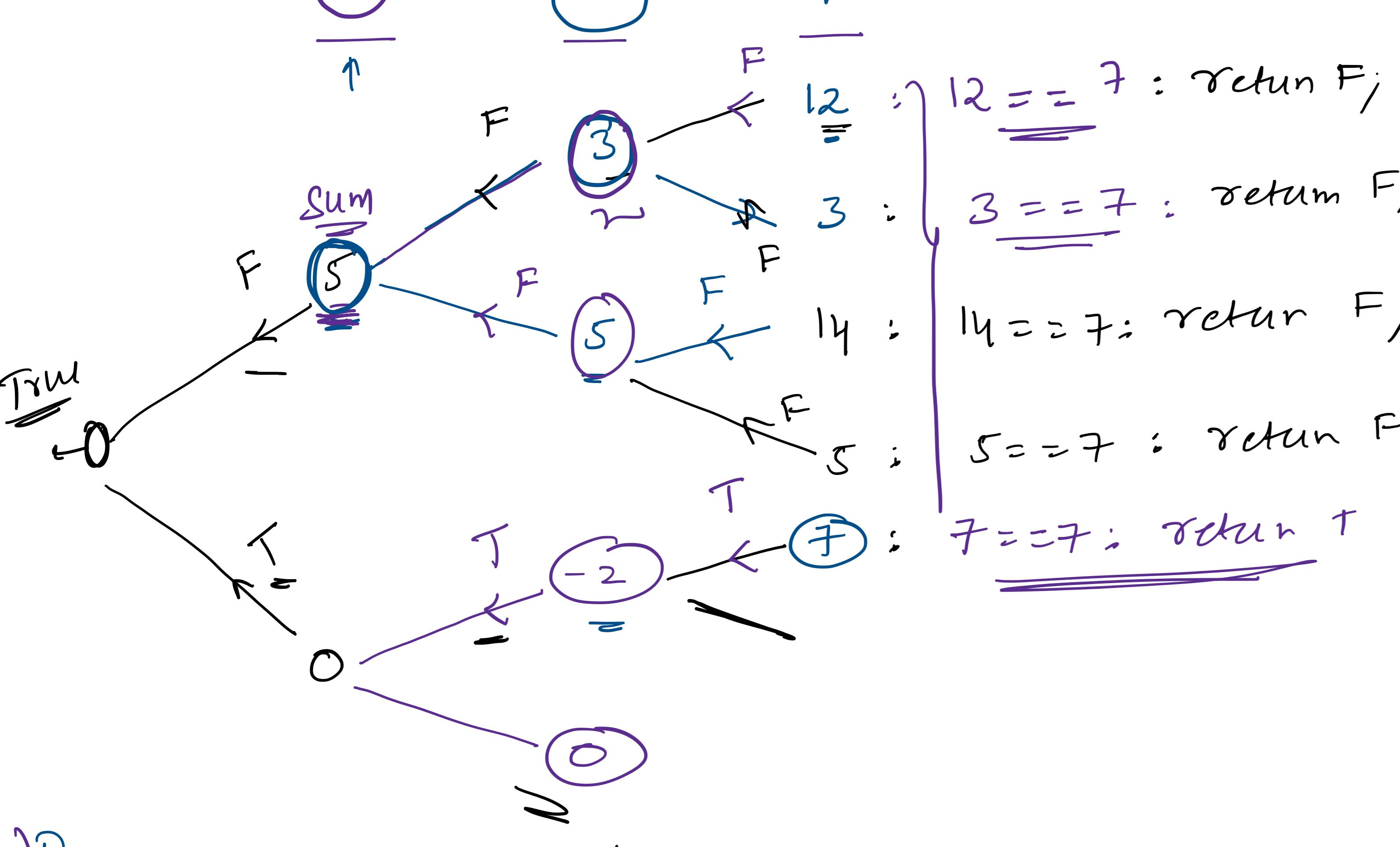
→ 2 function calls

Subproblems

```
void printArr(int arr[], int i, int n){  
    if (i == N) { print(arr); return; }  
  
    // Index i, we need to make a decision at i:  
    arr[i] = 1; // Decision has been made  
    printArr(arr, i+1, n)  
    arr[i] = 2;  
    printArr(arr, i+1, n)}
```

2) Q) Check if there exists a subset with sum = k

$arr[]: 5 \ -2 \ 9 \ K=7$



1) Parameters:

$arr[], N, i, sum, k$

2) Function calls:

How many choices are there, it will decide function calls

3) Update parameters:

For a given choice how to update parameters

```
bool subset(int arr[], int i, int N, int sum, int k){  
    if (i == N) {  
        if (sum == k) return True;  
        else return False; } }
```

return [subset($\underline{arr[i+1]}$, \underline{N} , $\underline{sum + arr[i]}$, \underline{k}) || subset($\underline{arr[i+1]}$, \underline{N} , \underline{sum} , \underline{k})]

Picking arr[i]

Not picking arr[i]

Another way

$sum = sum + arr[i]$ // subset($arr, i+1, N, sum, k$)

$sum = sum - arr[i]$ // subset($arr, i+1, N, sum, k$)

subset($arr, i+1, N, sum, k$)

3) Given a string, how many different ways you can partition your string such that each partition is palindrome.

Ex: a n a n a n

Ways: a + n a n a n

Ways: a n a + n a n

Ways: a n a n + a n

Ways: a + n a m + a n

Ways: a + n + a + n + a

Ways: a + n + a n + a

Ways: a + n + a + n a

Input:

0 1 2 3 4 5

a n a n a n

→ a ways(mana)

an * ways(na)

ana + ways(a)

anan * ways(n)

anana + ways(n)

ananan * ways(n)

Sum of all them

ways(mana)

m + n + b

m + n + b

2 ways

Parameters: ways(String s, int i, int N){
if (i == N) { // we partitioned entire strg, palindrome }
return 1; }

int cut = 0;

for (int j = i; j < N; j++) {

if (palindrome(s, i, j)) {

cut += ways(s, j+1, N); } }

return cut; }

Choices/ All function calls

update parameters

man + a n

a n

5 ways (i=6) // That means I partitioned into 5 ways