

## Module02\_Day09\_Recursion\_2

December 16, 2022

Recursion 2

```
[ ]: def staircase(n): #  $O(2^n)$ 
    if n == 1 or n == 2:
        return n
    return staircase(n-1) + staircase(n-2)

staircase(7)
```

[ ]: 21

```
[ ]: def perm(arr): #  $O(n!)$ 
    result = []
    if len(arr) == 1:
        return [arr]

    for i in range(len(arr)):
        ele = arr[i]
        remaining_ele = arr[:i] + arr[i+1:]
        remaining_perm = perm(remaining_ele)

        for p in remaining_perm:
            result.append([ele] + p)

    return result

print(perm(["a", "b", "c"]))
```

```
[['a', 'b', 'c'], ['a', 'c', 'b'], ['b', 'a', 'c'], ['b', 'c', 'a'], ['c', 'a', 'b'], ['c', 'b', 'a']]
```

```
[ ]: def merge(A,B):
    n = len(A)
    m = len(B)
    C = list()
    i,j = 0,0
    while(i<n and j <m):
        if A[i] < B[j]:
            C.append(A[i])
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        i += 1
    else:
        C.append(B[j])
        j += 1
    C = C + A[i:] + B[j:]

    return C

def mergeSort(arr):
    if len(arr) == 1:
        return list(arr)
    else:
        l = 0
        r = len(arr)
        m = (l+r)//2
        return merge(mergeSort(arr[l:m]), mergeSort(arr[m:])) # nlogn

mergeSort([51,1,3,2,5,3,7,2,8,9,10,51,27,4,51])

```

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[ ]: [1, 2, 2, 3, 3, 4, 5, 7, 8, 9, 10, 27, 51, 51, 51]
```

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```
[ ]: def bp(string, n):
    if n>0:
        print(string[n], end='')
        bp(string, n-1)
    elif n==0:
        print(string[0])

s = "news"
bp(s, len(s)-1)

```

swen

```
[ ]: l = [ ]
def convert(b):
    if(b==0):
        return l
    digit=b%2
    l.append(digit)
    convert(b//2)

convert(6)
l.reverse()
for i in l:

```

```
print(i,end="")
```

110

```
[ ]: def sum_series(n):  
    if n == 1 or n == 0:  
        return n  
    return n + sum_series(n-2)  
  
sum_series(10)
```

[ ]: 30

```
[ ]: def harmonic_sum(n):  
    if n == 1:  
        return 1  
    return harmonic_sum(n-1) + 1/n  
  
harmonic_sum(2)
```

[ ]: 1.5

```
[ ]: def rev(n, temp=''):  
  
    if n == 0:  
        return temp  
    return rev(n//10,temp + str(n%10))  
  
rev(100)
```

[ ]: '001'