

## CSCI 204: Data Structures & Algorithms

### Recursion 1

## Recursion

We saw some recursions in CSCI 203.

We want to review a bit and move to another level.

**Definition:** Recursion is a problem solving technique that defines a problem in terms of itself.

Recursion has two features:

- A recursive call with a small size of the same problem
- At least one base case

## A Quick Example

Walk across a room with recursive thinking!

```
If more distance to cover:
    take a step
    walk( distance - 1)
else:
    stop
```

## Python function walk()

```
def walk( distance ) :
    # Base case : reached other side
    if distance == 0:
        return
    # Recursive case : not there yet , take a step
    else :
        step (distance)
        walk ( distance-1)

def step(d):
    print('Walking one step ... remaining distance ' + str(d))
```

## Another example

What does the following recursive function do?

```
def method_one ( counter ):
    if counter == 0:
        return
    else :
        method_one ( counter - 1 )
        print ( 'Hello ' + str( counter ) )

method_one(3)
```

```
Hello 1
Hello 2
Hello 3
```

## One more example

```
def method_two ( counter ):
    if counter ==0:
        return
    else :
        print ('Hello '+str( counter ))
        method_two ( counter -1)
        print ('Bye '+str( counter ))

method_two(3)
```

```
Hello3
Hello2
Hello1
Bye1
Bye2
Bye3
```

## Recursion Workshop