SNS COLLEGE OF TECHNOLOGY

Coimbatore-35.
An Autonomous Institution

COURSE NAME : 23CST101 PROBLEM SOLVING AND C PROGRAMMING

I YEAR/ I SEMESTER

UNIT-IV FUNCTIONS AND POINTERS

Topic: Recursion

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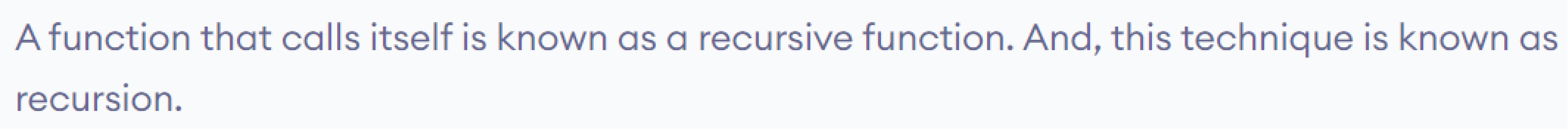
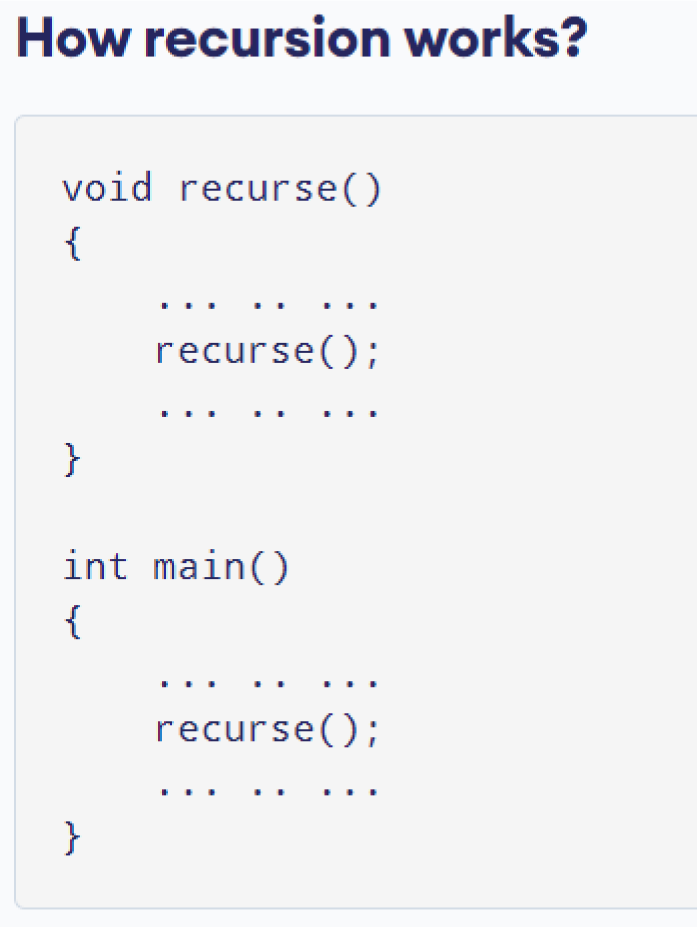
Recursion



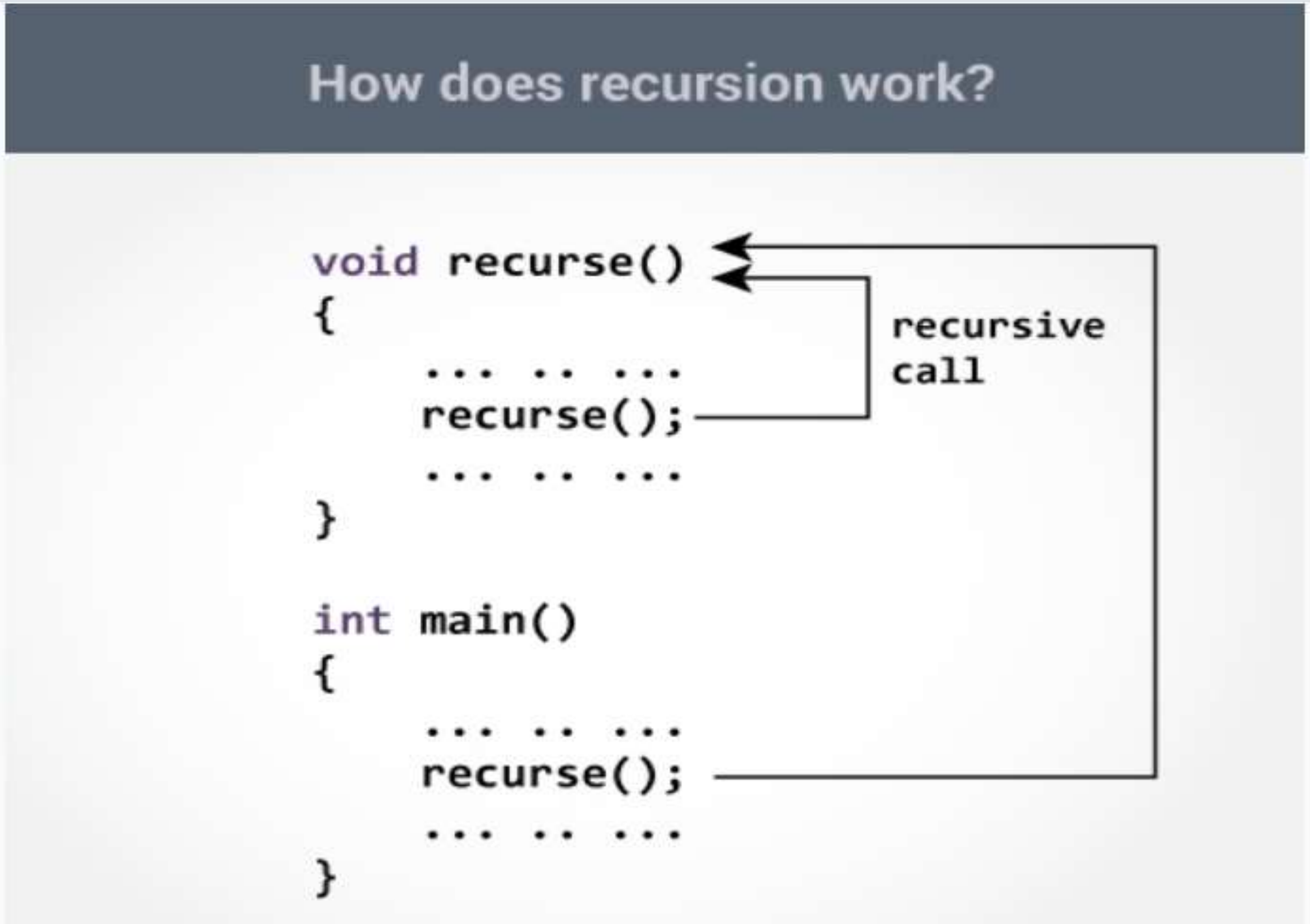
A function that calls itself is known as a recursive function. And, this technique is known as recursion.



How recursion works?

```
void recurse()
{
    ... .. ...
    recurse();
    ... .. ...
}

int main()
{
    ... .. ...
    recurse();
    ... .. ...
}
```

C Recursion

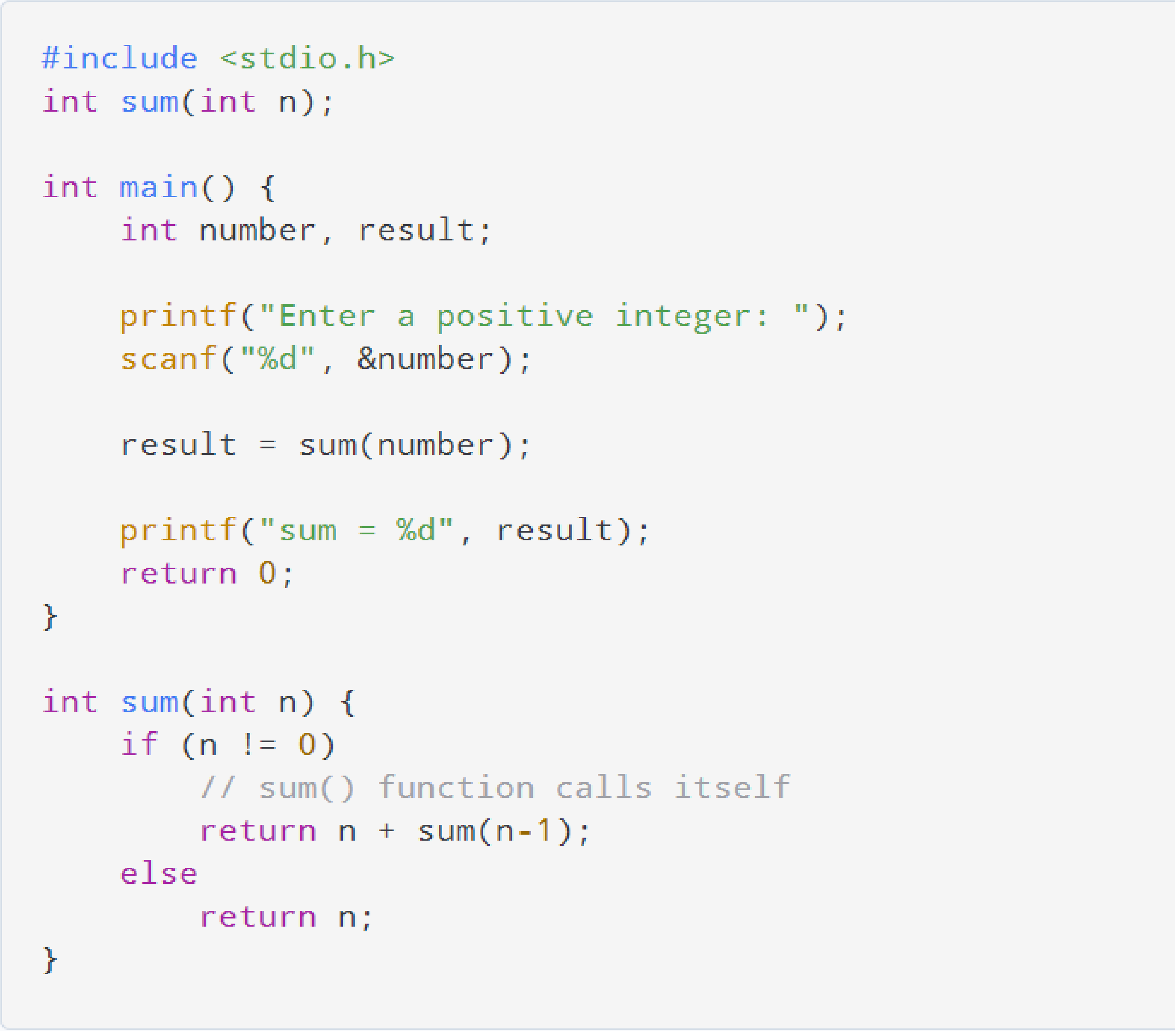


How does recursion work?

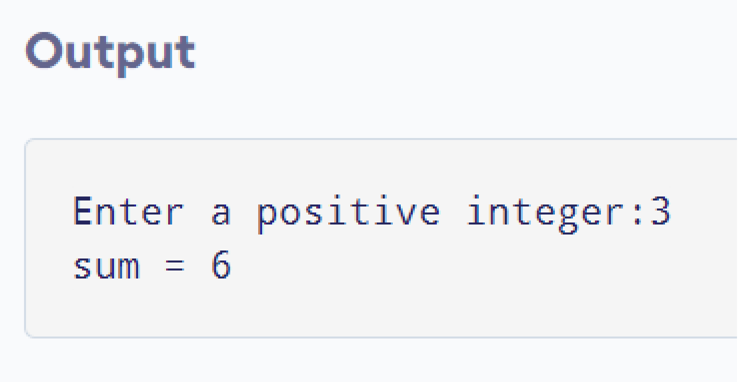
```
void recurse()
{
    ... .. ...
    recurse();
    ... .. ...
}

int main()
{
    ... .. ...
    recurse();
    ... .. ...
}
```

The recursion continues until some condition is met to prevent it.

Example: Sum of Natural Numbers Using Recursion



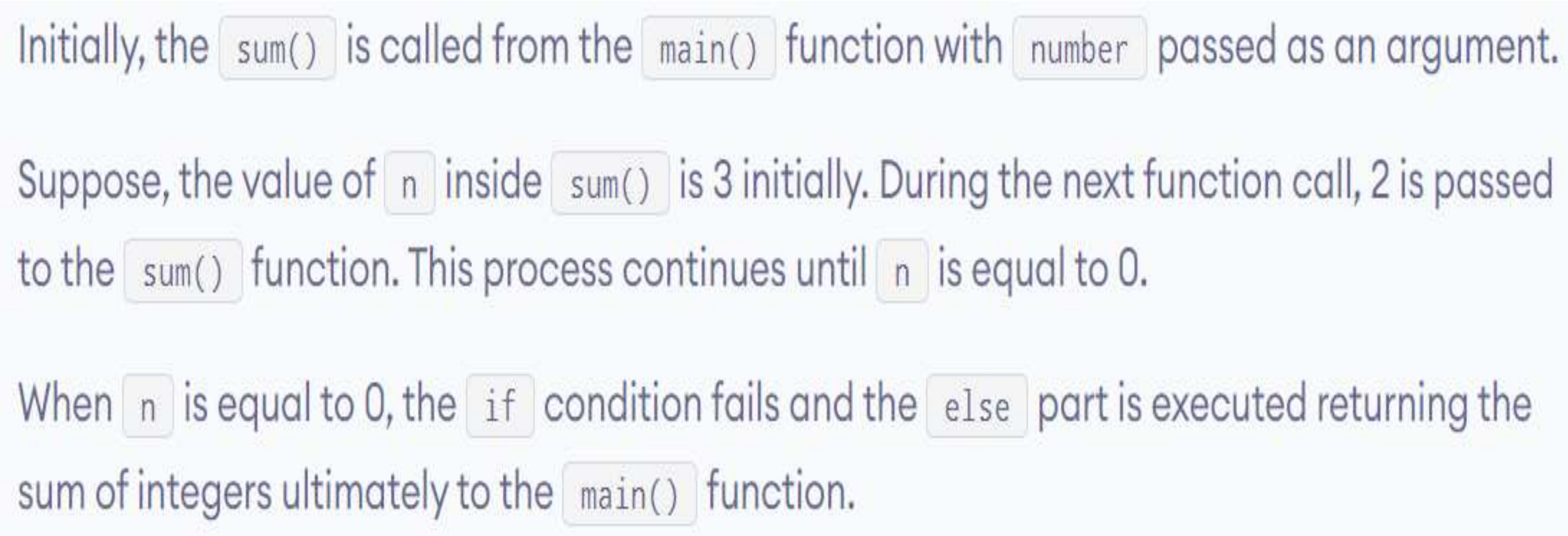
```c
#include <stdio.h>
int sum(int n);

int main() {
    int number, result;

    printf("Enter a positive integer: ");
    scanf("%d", &number);

    result = sum(number);

    printf("sum = %d", result);
    return 0;
}

int sum(int n) {
    if (n != 0)
        // sum() function calls itself
        return n + sum(n-1);
    else
        return n;
}
```



Output

```
Enter a positive integer:3
sum = 6
```

C Recursion

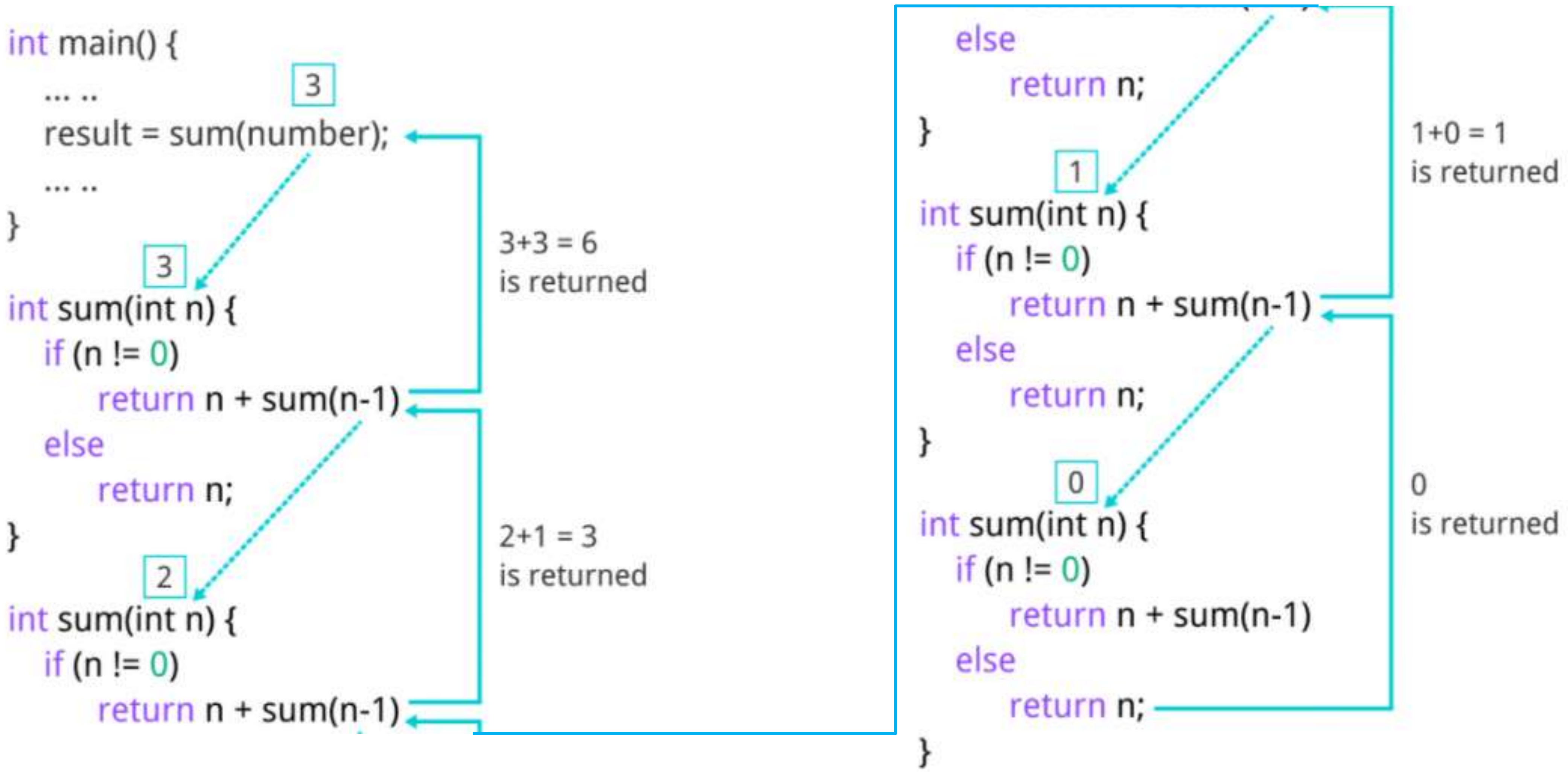


Initially, the `sum()` is called from the `main()` function with `number` passed as an argument.

Suppose, the value of `n` inside `sum()` is 3 initially. During the next function call, 2 is passed to the `sum()` function. This process continues until `n` is equal to 0.

When `n` is equal to 0, the `if` condition fails and the `else` part is executed returning the sum of integers ultimately to the `main()` function.

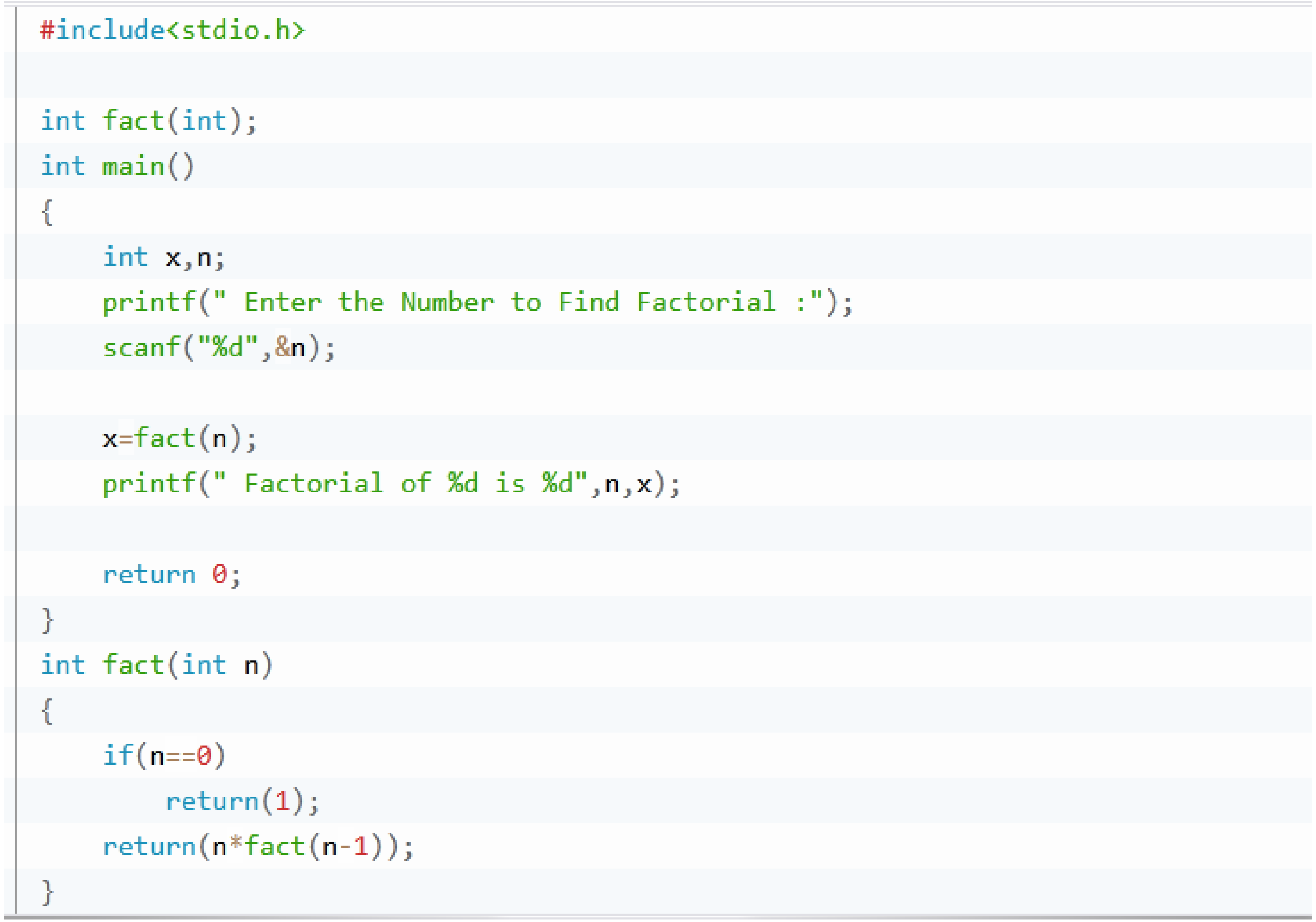
C Recursion



```
int main() {
    ... ..
    result = sum(number);
    ... ..
}

int sum(int n) {
    if (n != 0)
        return n + sum(n-1)
    else
        return n;
}

int sum(int n) {
    if (n != 0)
        return n + sum(n-1)
```

```
    else
        return n;
}

int sum(int n) {
    if (n != 0)
        return n + sum(n-1)
    else
        return n;
}

int sum(int n) {
    if (n != 0)
        return n + sum(n-1)
    else
        return n;
}
```

Factorial Using Recursion



```c
#include<stdio.h>

int fact(int);
int main()
{
    int x,n;
    printf(" Enter the Number to Find Factorial :");
    scanf("%d",&n);

    x=fact(n);
    printf(" Factorial of %d is %d",n,x);

    return 0;
}
int fact(int n)
{
    if(n==0)
        return(1);
    return(n*fact(n-1));
}
```

Thank You!