Ex. No: 2 **Date: 20.08.24**

Register No.: 230701351 **Name: Suganya S**

Finding Time Complexity of Algorithms

2.a. Finding Complexity using Counter Method

Aim: Convert the following algorithm into a program and find its time complexity using the counter method.

```
Void function (int n)
{
        int i= 1;
        int s =1;
        while(s <= n)
        {
        i++;
        s += i;
        }
}
```

Note: No need of counter increment for declarations and scanf() and count variable printf() statements.

Input:

A positive Integer n

Output:

Print the value of the counter variable

Algorithm:

1. Initialize count to 0.
2. Initialize i to 1 and increment count by 1.
3. Initialize s to 1 and increment count by 1.
4. While s is less than or equal to n:
5. Increment count by 1.

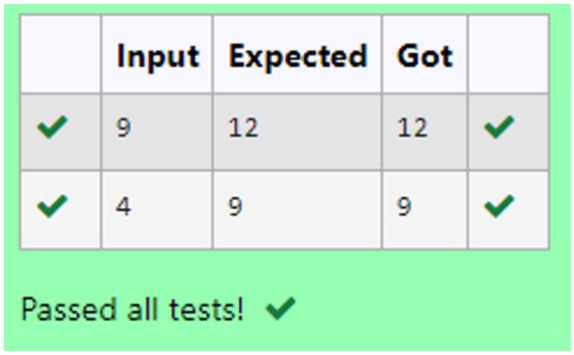
6. Increment i by 1 and increment count by 1.
7. Add i to s and increment count by 1.
8. Increment count by 1 after the loop ends.
9. Print the value of count

Program:

```
#include <stdio.h>
void function(int n)
{
        int count=0;
        int i=1;
        count++;
        int s=1;
        count++;
        while(s<=n)
        {
                count++;
                i++;
                count++;
                s+=i;
                count++;
        }
        count++;
        printf("%d",count);
}
int main()
{
        int n;
```

```
    scanf("%d",&n);
    function(n);
}
```

Output:



	Input	Expected	Got	
✔	9	12	12	✔
✔	4	9	9	✔

Passed all tests! ✔

2.b. Finding Complexity using Counter Method

Aim:

Convert the following algorithm into a program and find its time complexity using the counter method.

```
void func(int n)
{
        if(n==1)
        {
                printf("*");
        }
        else
        {
                for(int i=1; i<=n; i++)
                {       for(int j=1; j<=n; j++)
                        {
                                printf("*");
                                printf("*");
                                break;
                        }
                }
        }
```

Note: No need of counter increment for declarations and scanf() and count variable printf() statements.

Input:

A positive Integer n

Output:

Print the value of the counter variable

Algorithm:

1. Initialize count to 0.
2. If n is equal to 1:
3. Increment count by 1.
4. Print *.
5. Else:
6. Increment count by 1.
7. For each i from 1 to n:
    a. Increment count by 1.
    b. For each j from 1 to n:
        i. Increment count by 1.
        ii. Increment count by 1 (for printf("*")).
        iii. Increment count by 1 (for printf("*")).
        iv. Increment count by 1 (for break statement).
    c. Increment count by 1 (after inner loop ends).
8. Increment count by 1 (after outer loop ends).

Program:

#include void func(int n)

{

```
int count=0;
if(n==1)
{
    count++;
    printf("*");
}
else
```

```
        {
                count++;
                for(int i=1; i<=n; i++)
                {
                        count++;
                       for(int j=1; j<=n; j++)
                        {
                                count++;
                                //printf("*");
                                count++;
                                //printf("*");
                                 count++;
                                break;
                        }
                        count++;
                }
                 count++;
        }
        printf("%d",count);
}
 int main()
{
        int n;
         scanf("%d",&n);
         func(n);
 }
```

Output:

	Input	Expected	Got	
✔	2	12	12	✔
✔	1000	5002	5002	✔
✔	143	717	717	✔