02 - Finding Time Complexity of Algorithms

Ex. No. : 2.1 **Date: 20.08.24**

Register No.: 230701348 **Name: N Subramanian**

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

For example:

Input	RESULT
9	12

ALGORITHM:

Step 1: Start

Step 2: Read the value of n from the user.

Step 3: Call the function func(n), initializing count, i to 1, and s to 1. Increment count (1st increment).

Step 4: While s <= n, increment count (2nd increment), then increment i and update s by adding i. Increment count again (3rd increment).

Step 5: After exiting the loop, increment count (4th increment).

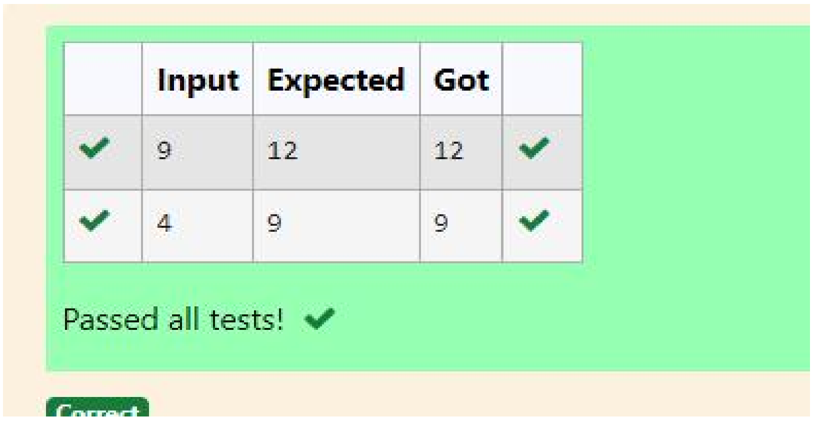
Step 6: Print the value of count.

Step 7: End

PROGRAM:

```
#include<stdio.h>

void function(int n){

    int i=1;int c=1;

    int s=1;c++;

    while(s<=n)

    {

        i++;c++;

        s+=i;c++;

        c++;
    }c++;
    printf("%d",c);
}
int main(){
    int a;
    scanf("%d",&a);
    function(a);
}
```

OUTPUT:



	Input	Expected	Got	
✓	9	12	12	✓
✓	4	9	9	✓

Passed all tests! ✓

RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.2 **Date: 20.08.24**

Register No.: 230701348 **Name: N Subramanian**

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:

Step 1: Start

Step 2: Read the value of n from the user.

Step 3: Call the function func(n).

Step 4: In func, if n == 1, increment count (1st increment).

Step 5: If n > 1, increment count (2nd increment) and loop i from 1 to n, increment count (3rd increment) for each iteration, and loop j from 1 to n, incrementing count (4th increment) three times, then break. Increment count (5th increment) after the inner loop, and once more after the outer loop (6th increment).

Step 6: Print the value of count.

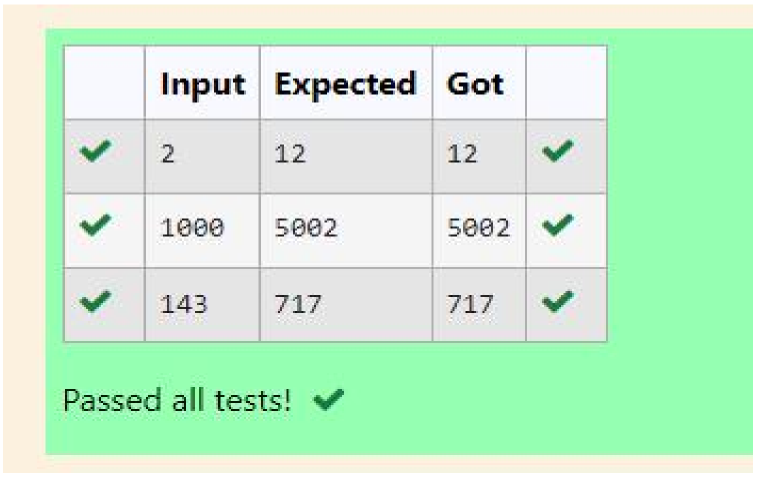
Step 7: End

PROGRAM:

```
#include<stdio.h>

void func(int n)

{

   int c=0;

   c++;

   if(n==1)

   {
    //printf("*");
}
else
{
    for(int i=1; i<=n; i++)
    {
        for(int j=1; j<=n; j++)
        {
            c++;
            c++;
            c++;
            //printf("*");
            //printf("*");
            c++;
            break;
        }
        c++;
    }
    c++;
}printf("%d",c);
```

```
}
int main(){
    int a;
    scanf("%d",&a);
    func(a);
}
```

OUTPUT:



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

Passed all tests! ✓

RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.3 **Date: 20.08.24**

Register No.: 230701348 **Name: N Subramanian**

AIM:

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

```
 Factor(num) {
 {
         for (i = 1; i <= num;++i)
         {
     if (num % i== 0)
         {
          printf("%d ", i);
         }
          }
 }
```

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

Input:

A positive Integer n

Output:

Print the value of the counter variable

ALGORITHM:

Step 1: Start

Step 2: Read the value of n from the user.

Step 3: Call the function Factor(n).

Step 4: In Factor, loop i from 1 to num, increment count (1st increment).

Step 5: For each i, check if num % i == 0. If true, increment count (2nd increment). Increment count again (3rd increment) for the end of the loop.

Step 6: After the loop, increment count (4th increment).

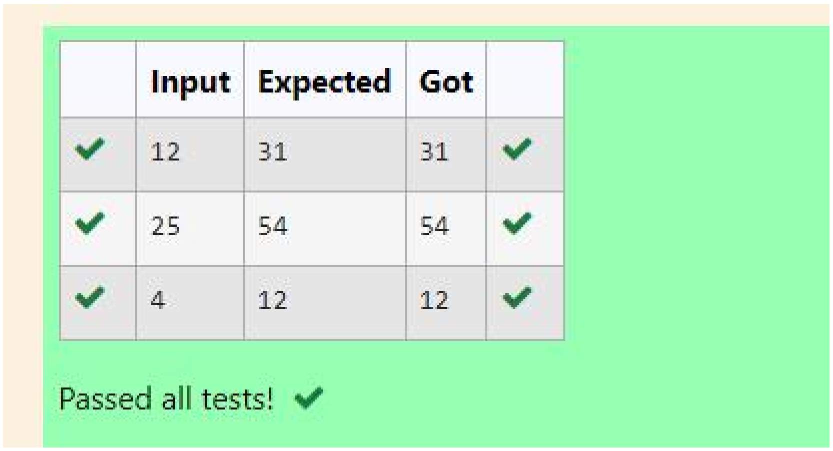
Step 7: Print the value of count.

Step 8: End

PROGRAM:

```
#include<stdio.h>

void Factor(int num){

    int c=0;

    for(int i=1;i<=num;++i){

        c++;

        c++;

        if(num%i==0){

            //printf("%d ",i);
            c++;
        }
    }
    c++;
    printf("%d",c);
}
int main(){
    int a;
    scanf("%d",&a);
    Factor(a);
}
```

OUTPUT:



	Input	Expected	Got	
✓	12	31	31	✓
✓	25	54	54	✓
✓	4	12	12	✓

Passed all tests! ✓

RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.4 **Date: 20.08.24**

Register No.: 230701348 **Name: N Subramanian**

AIM:

Convert the following algorithm into a program and find its time

complexity using counter method.

```
void function(int n)
{
    int c= 0;
    for(int i=n/2; i<n; i++)
        for(int j=1; j<n; j = 2 * j)
            for(int k=1; k<n; k = k * 2)
                c++;
}
```

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:

Step 1: Start

Step 2: Read the value of n from the user.

Step 3: Call the function function(n).

Step 4: In function, initialize c to 0 and increment count (1st increment).

Step 5: Loop i from n/2 to n, incrementing count (2nd increment), and for each i, loop j from 1 to n, doubling j each time, incrementing count (3rd increment).

Step 6: Inside the j loop, loop k from 1 to n, doubling k each time, incrementing count (4th increment), increment c, and increment count (5th increment). Increment count again after the k loop (6th increment) and after the j loop (7th increment).

Step 7: Increment count after the i loop (8th increment).

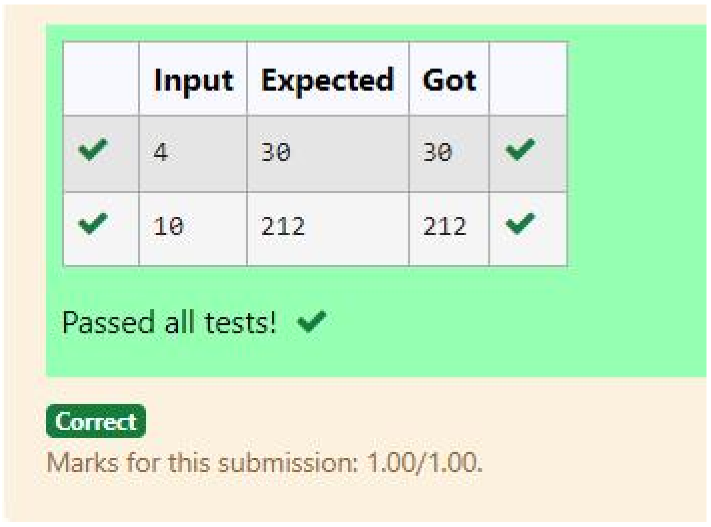
Step 8: Print the value of count.

Step 9: End

PROGRAM:

```
#include<stdio.h>

void function(int n)

{

   int c= 0,co=1;

   for(int i=n/2; i<n; i++){
        co++;
        for(int j=1; j<n; j = 2 * j){
            co++;
            for(int k=1; k<n; k = k * 2){
                co++;
                co++;
                c++;
            }co++;
        }co++;
    }co++;
    printf("%d",co);
}
int main(){
    int a;
    scanf("%d",&a);
    function(a);
}
```

OUTPUT:



	Input	Expected	Got	
✓	4	30	30	✓
✓	10	212	212	✓

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.5 **Date: 20.08.24**

Register No.: 230701348 **Name: N Subramanian**

AIM:

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

```
void reverse(int n)

{

  int rev = 0, remainder;

  while (n != 0)

        {

        remainder = n % 10;

        rev = rev * 10 + remainder;

          n/= 10;

        }

print(rev);

}
```

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:

Step 1: Start

Step 2: Read the value of n from the user.

Step 3: Call the function reverse(n).

Step 4: In reverse, initialize rev to 0 and increment count (1st increment).

Step 5: While n is not 0, increment count (2nd increment), calculate remainder as n % 10, and increment count (3rd increment). Update rev by multiplying it by 10 and adding remainder, then increment count (4th increment). Divide n by 10 and increment count (5th increment).

Step 6: After exiting the loop, increment count (6th increment) and again for the commented print statement (7th increment).

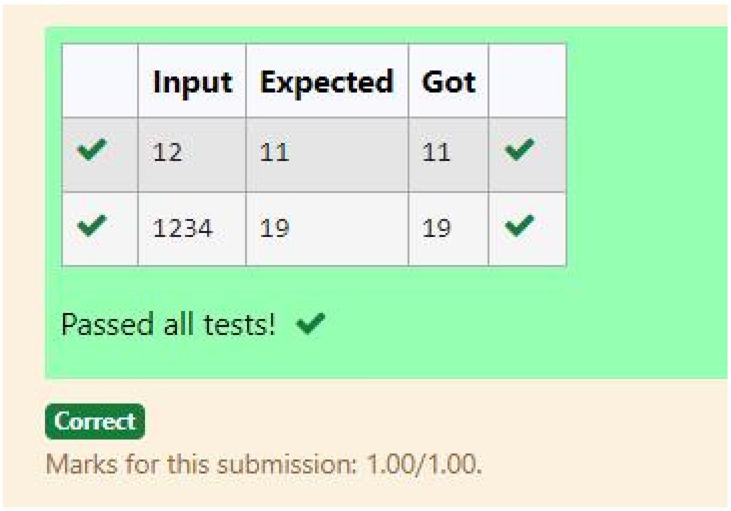
Step 7: Print the value of count.

Step 8: End

PROGRAM:

```
#include<stdio.h>

void reverse(int n)

{

   int rev = 0, rem,c=1;

   while (n != 0)

   {
       c++;

       rem = n % 10;c++;

       rev = rev * 10 + rem;c++;

       n/= 10;c++;

   }c++;

   //print(rev);

   c++;

   printf("%d",c);

}

int main(){

   int a;

   scanf("%d",&a);

   reverse(a);

}
```

OUTPUT:



	Input	Expected	Got	
✓	12	11	11	✓
✓	1234	19	19	✓

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

RESULT:

Hence the above program has been executed successfully.