02 - Finding Time Complexity of Algorithms

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

Register No.: 230701385 **Name: S VISHWAK**

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.

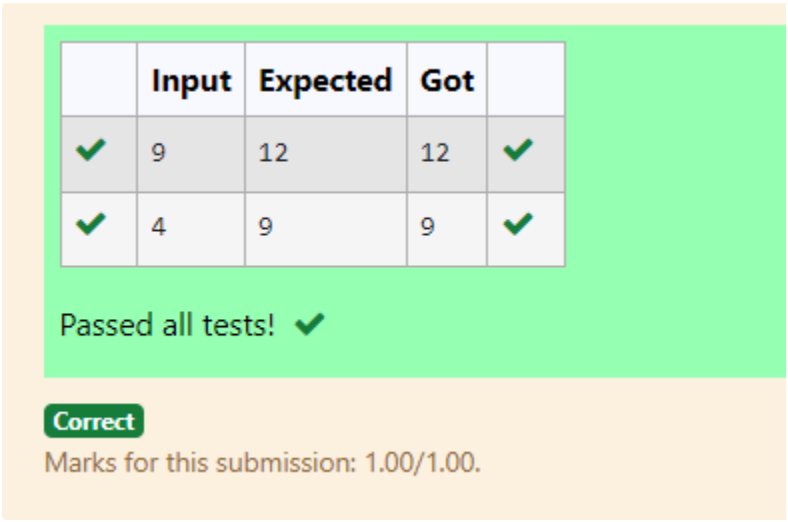
Step 7: End

PROGRAM:

```
#include<stdio.h>

void function(int n)

{

   int count=0;

   int i=1;

   count++;

   int s=1;

   count++;

   while(s<=n)
```

```
    {
        i++;
        count++;
        s+=i;
        count++;
        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! ✔

Correct

Marks for this submission: 1.00/1.00.

RESULT:

Hence the above program has been executed successfully.

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

Register No.: 230701385 **Name: S VISHWAK**

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.

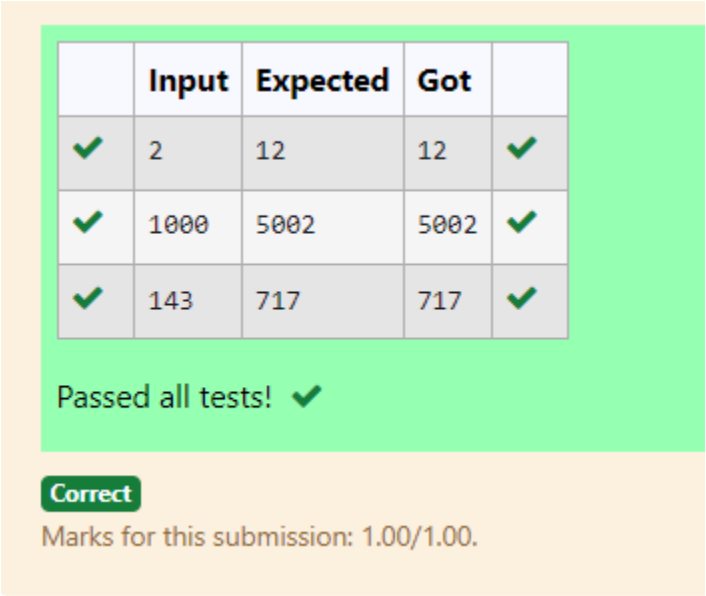
Step 7: End

PROGRAM:

```
#include<stdio.h>
void func(int n)
{
    int count=0;
    if(n==1)
    {
        count++;
    }
    else
    {
        count++;
        for(int i=1;i<=n;i++)
        {
            count++;
            for(int j=1;j<=n;j++)
            {
                count++;
                count++;
                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	✔

Passed all tests! ✔

Correct

Marks for this submission: 1.00/1.00.

RESULT:

Hence the above program has been executed successfully.

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

Register No.: 230701385 **Name: S VISHWAK**

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).

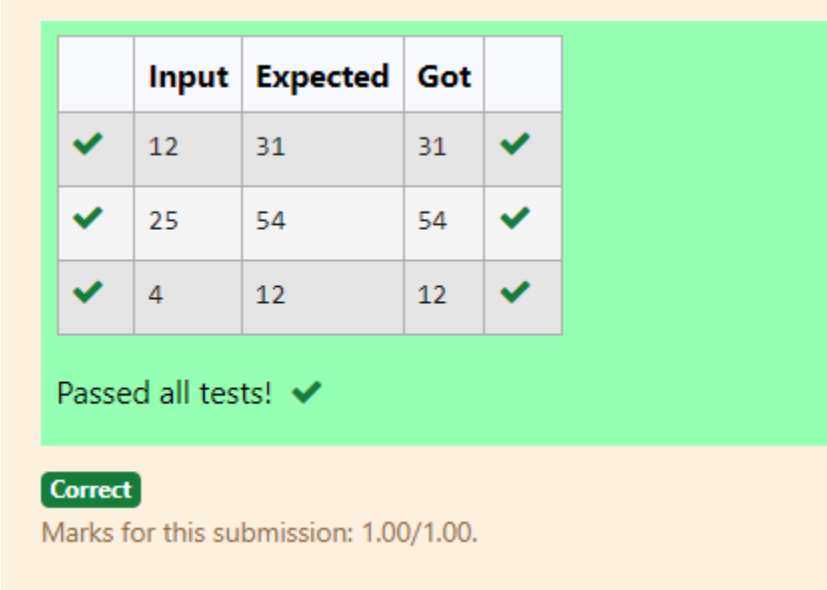
Step 7: Print the value of count.

Step 8: End

PROGRAM:

```
#include<stdio.h>
void Factor(int num)
{
    int i,count=0;
    for(i=1;i<=num;i++)
    {
        count++;
        if(num%i==0)
        {
            count++;
        }
        count++;
    }
    count++;
    printf("%d",count);
}
int main()
{
    int num;
    scanf("%d",&num);
    Factor(num);
}
```

OUTPUT:



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

Passed all tests! ✔

Correct

Marks for this submission: 1.00/1.00.

RESULT:

Hence the above program has been executed successfully.

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

Register No.: 230701385 **Name: S VISHWAK**

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

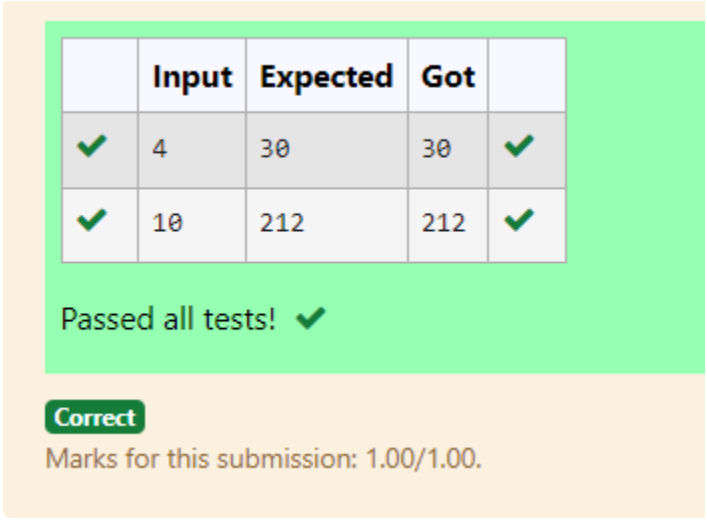
PROGRAM:

```
#include<stdio.h>

void function(int n)

{

    int count=0;

    int c=0;
```

```
    count++;
    for(int i=n/2;i<n;i++)
    {
        count++;
        for(int j=1;j<n;j=2*j)
        {
            count++;
            for(int k=1;k<n;k=k*2)
            {
                c++;
                count++;
                count++;
            }
            count++;
        }
        count++;
    }
    count++;
    printf("%d",count);
}
```

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

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.: 230701385 **Name: S VISHWAK**

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.

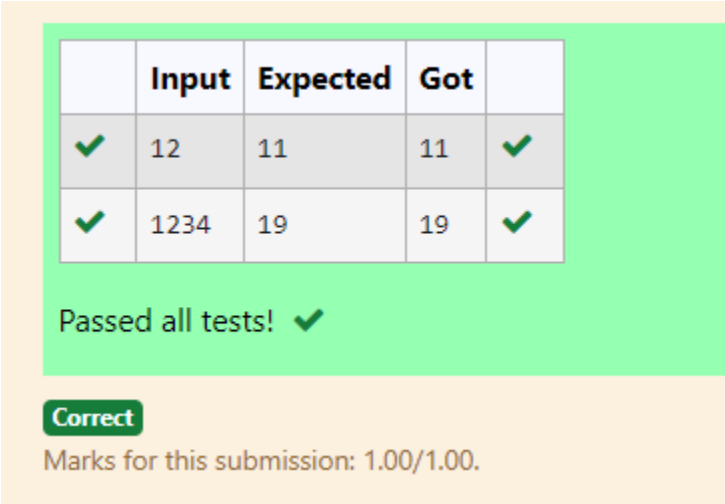
Step 8: End

PROGRAM:

```
#include<stdio.h>

void reverse(int n)

{

    int count=0;

    int rev=0;

    count++;
```

```
    int remainder;
    count++;
    while(n!=0)
    {
        count++;
        remainder=n%10;
        count++;
        rev=rev*10+remainder;
        count++;
        n/=10;
        count++;
    }count++;
    printf("%d",count);
}
int main()
{
    int n;
    scanf("%d",&n);
    reverse(n);
}
```

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.