

02 - Finding Time Complexity of Algorithms

Ex. No. : 2.1

Date: 20.08.24

Register No.: 230701344

Name: SRIWANTH
SATHISH

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 $s \leq n$, 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.: 230701344

Name: SRIWANTH
SATHISH

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.: 230701344

Name: SRIWANTH
SATHISH

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.: 230701344

Name: SRIWANTH
SATHISH

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

Name: SRIWANTH

Register No.: 230701344

SATHISH

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.