02 - Finding Time Complexity of Algorithms

Ex. No. : 2.1 Date: 20.08.24

Register No.: 230701373 Name: SP VARUN

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;
    }
}</pre>
```

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).

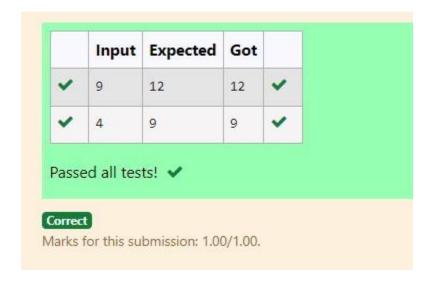
Step 6: Print the value of count.

Step 7: End

PROGRAM:

```
#include<stdio.h>
void function(int n)
{
  int
  count=0;
  int i=1;
  count++;
  int s=1;
  count++;
```

```
while(s \le n)
    i++;
     count++;
     s+=i;
     count++;
     count++;
  count++;
  printf("%d",count);
int main()
  int n;
  scanf("%d",&n);
  function(n);
OUTPUT:
```



RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.2 Date: 20.08.24

Register No.: 230701373 Name: SP VARUN

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++) {</pre>
```

```
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).

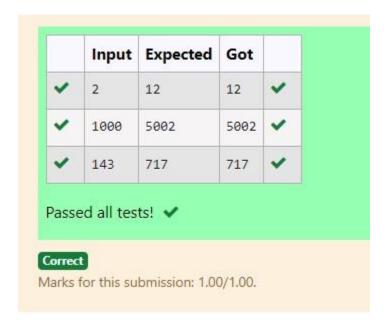
Step 5: If n > 1, increment count (2nd increment) and loop i from 1 to n, increment count (3rd increment) for each iteration, and loop j from 1 to n, incrementing count (4th increment) three times, then break. Increment count (5th increment) after the inner loop, and once more after the outer loop (6th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



RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.3 Date: 20.08.24

Register No.: 230701373 Name: SP VARUN

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);}
}</pre>
```

```
}
}
```

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	~

RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.4 Date: 20.08.24

Register No.: 230701373 Name: SP VARUN

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)</pre>
```

```
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:

RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.5 Date: 20.08.24

Register No.: 230701373 Name: SP VARUN

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	.,

RESULT: Hence the above program has been executed successfully.
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