كلية علوم الحاسوب وتكنولوجيا المعلومات

المرحلة الثانية

مادة الخورازميات

م.م فرح معاذ جاسم

2.1Time complexity

Time complexity of an algorithm represents the amount of time required by the algorithm to run to completion. Time requirements can be defined as a numerical function T(n), where **T(n)** can be measured as the number of steps, provided each step consumes constant time.

2.2Time operation **T(o)** can be measured as the number of operations in algorithm.

Example 1 :- compute the time complexity and time operation for the following sub program.

```
-cout<<"Enter two number";

-cin>>n1>>n2;

-if(n1>=n2)

-Max=n1;

Else

-Max=n2;    i++;

-cout<<"The max="<<Max<<"\n";
```

Sol:-

steps	T(n)	T(o)
cout<<"Enter two number";	1	1
-cin>>n1>>n2;	1	2 //2 op
-if(n1>=n2)	1	1
-Max=n1;	1	1
Else	or	or
-Max=n2; i++;	1	2 //2 op
cout<<"Themax="<<Max<<"\n";	1	3 //3 op
Total	5	8 or 9

Example 2 :- compute the time complexity and time operation for the following sub program.

1

```
- i=0;
- cin>>x;
- while(i<5)
- {     y=x+5;
- i++;
  }
```

2

```
-count =1;
-sum=0;
-while(count<w)
-{ sum=sum+w;
-cin>>w;
  }
```

Sol 1:-

steps	T(n)	T(o)
- i=0;	1	1
- cin>>x;	1	1
-while(i<5)	0 to 5=6 *//loop*	0 to 5=6 *//loop*
-y=x+5;	1*5 *//in loop*	2*5 *//in loop*
- i++;	1*5 *//in loop*	1*5 *//in loop*
total	18	23

Sol 2:-

steps	T(n)	T(o)
-count =1;	1	1
-sum=0;	1	1
-while(count<w)	W+1 *//loop*	W+1 *//loop*
sum=sum+w;	1*w *//in loop*	2*w *//in loop*
-cin>>w;	1*w *//in loop*	1*w *//in loop*
total	3+3w	3+4w

Example 3 :- compute the time complexity and time operation for the following sub program.

```
cout<<"Enter positive number"<<"\n";
count=0;
sum=0;
```

```
cin>>num;
while(num !=-1)
{
sum=sum+num;
count++;
num--;
}
cout<<"the sum="<<sum<<"\n";
if(count !=0)
av=sum/count;
else
av=0;
cout<<"the av ="<<av<<"\n";
```

sol:-

steps	T(n)	T(o)
cout<<"Enterpositive n"<<"\n";	1	2
count=0;	1	1
sum=0;	1	1
cin>>num;	1	1
while(num !=-1)	num+1	Num+1
sum=sum+num;	1*num	2*num
count++;	1*num	1*num
num--;	1*num	1*num
cout<<"the sum="<<sum<<"\n"	1	3 //3op

if(count !=0)	1	1
av=sum/count;	1	2 //2op
else	or	or
av=0;	1	1
cout<<"the av ="<<av<<"\n";	1	3
total	9+4num	15+5num Or 14+5num

Home Work: compute the time complexity and time operation for the following sub program.

```
cin>>n; sum=0; i=0;

While(i<n)

{ cin>>number;

Sum=sum+number;

i++;}
```