

## Practice with Big-O Notation

1) Let  $a$  and  $b$  be positive constants. Show that if  $f$  is  $O(\log_a n)$  then  $f$  is also  $O(\log_b n)$ .

Determine the running time of the following program segments in Big-O notation. Take the size of the input as  $n$ , unless otherwise stated.

2)

```
double sum=0;
for(int i=0; i<1000000;i++)
    sum+=sqrt(i);
```

3)

```
while(n>1)
{
    n=n/2;
    cout<<"This is a useless code";
}
```

4)

```
int count=0;
for(i=0;i<n;i++)
{
    count++;
}
```

What happens if we take the size of the input as  $\log(n)$  as opposed to  $n$ ?

5)

```
for(i=0;i<n;i++)
{
    m=n;
    while(m>1)
    {
        m=m/2;
        cout<<m<<endl;
    }
}
```

6)

```
for(i=0;i<n;i++)
{
    for(j=0;j<n;j++)
    {
        count++;
    }
}
```

- a) Considering the size of the input as  $n$
- b) Considering the size of the input as  $\log(n)$

7)

```
for(i=0;i<n;i++)
{
    for(j=i;j<n;j++)
    {
        count++;
    }
}
```

8)

```
int i, j,k;

for(k=0;k<n;k++)
{
    for(i=0;i<n;i++)
    {
        j=n;
        while(j>1)
        {
            j=j/3;
            cout<<i*j*k<<endl;
        }
    }
}
```

```
for(i=0;i<n;i++)
{
    cout<<i*i<<endl;
}
```