

IIUPC 2014
Problem G: Count It

Following is a code in C.

```
#include <stdio.h>
int num[1000006];

int main()
{
    int i,n,cas;

    num[0]=0;
    for(i=1;i<=1000000;i++) num[i]=num[i/2]+(i%2);

    scanf("%d",&cas);

    while(cas--)
    {
        scanf("%d",&n);
        printf("%d\n",num[n]);
    }

    return 0;
}
```

This code will work fine for values of n up to 10^6 . But for higher value of n , the code will not work for memory, time constraints. You have to write a code which will give identical result for higher values of n .

Input

The first line contains number of test case T ($1 \leq T \leq 500$). Each of the next T lines contains an integer n ($1 \leq n \leq 10^{18}$).

Output

For each of the test case you must output the answer in a line.

Sample Input	Output for Sample Input
3	1
4	2
5	2
6	

Problem Setter: Sakib Shafayat