2012 ACU Programming Contest Series

Problem 3: Recurse

The Amalagated Consortium Union (ACU) recently discovered an interesting recursive function, $f_k(i, j)$, deserving more investigation. The function f relies on the set generating function g (see Problem 2).

$f_k(i, j)$ = max($f_k(i, j-1)$, $f_k(e, j)$, $f_k(e, j-1)$), where $e \in g(i, j)$, if $j > 0$

$f_k(i, j)$ = number of 1 bits in the binary representation of $i + k$, if $j = 0$

$g(i, j) = \{ nj + i \bmod j + 1, nj + i \bmod j + 2, \ldots, nj + j - 1 \mid n=0, 1, \ldots, i / j \}$

Write a program to evaluate $f_k(i, j)$.

Input

The first line consists of a single integer, the number of data sets to process.

Each data set consists of a single line consisting of three non-negative integers, i, j, and k, all less than 100, separated by single spaces.

Sample input:

```
4
7 0 0
4 1 3
1 3 0
2 3 1
```

Output

Each data set should produce one line of output, the result of evaluating $f_k(i, j)$.

Sample output:

```
3
7
16
15
```