

8158 Cumulative Code

As you probably know, a *tree* is a graph consisting of n nodes and $n-1$ undirected edges in which any two nodes are connected by exactly one path. In a labeled tree each node is labeled with a different integer between 1 and n .

The *Prüfer code* of a labeled tree is a unique sequence associated with the tree, generated by repeatedly removing nodes from the tree until only two nodes remain. More precisely, in each step we remove the *leaf* with the smallest label and append the label of its *neighbour* to the end of the code. Recall, a leaf is a node with exactly one neighbour. Therefore, the Prüfer code of a labeled tree is an integer sequence of length $n-2$. It can be shown that the original tree can be easily reconstructed from its Prüfer code.

The *complete binary tree of depth k* , denoted with C_k , is a labeled tree with 2^k-1 nodes where node j is connected to nodes $2j$ and $2j+1$ for all $j < 2^{k-1}$. Denote the Prüfer code of C_k with $p_1, p_2, \dots, p_{2^k-3}$.

Since the Prüfer code of C_k can be quite long, you do not have to print it out. Instead, you need to answer n questions about the sums of certain elements on the code. Each question consists of three integers: a, d and m . The answer is the sum of the of the C_k 's Prüfer code elements $p_a, p_{a+d}, p_{a+2d}, \dots, p_{a+(m-1)d}$.

Input

The input file contains several test cases, each of them as described below.

The first line contains two integers k and q ($2 \leq k \leq 30, 1 \leq q \leq 300$) — the depth of the complete binary tree and the number of questions. The j -th of the following q lines contains the j -th question: three positive integers a_j, d_j and m_j such that a_j, d_j and $a_j + (m_j-1)d_j$ are all at most 2^k-3 .

Output

For each test case, output 1 lines. The j -th line should contain a single integer — the answer to the j -th question.

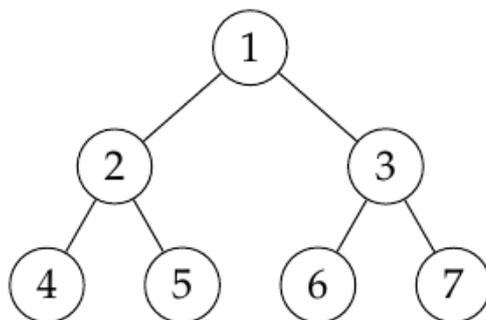
Note: In the first example below, when constructing the Prüfer code for C_3 the nodes are removed in the following order: 4, 5, 2, 1, 6. Therefore, the Prüfer code of C_3 is 2, 2, 1, 3, 3.

The picture on the right illustrates this case.

Sample Input

```

3 5
1 1 1
2 1 1
3 1 1
4 1 1
5 1 1
4 4
2 1 5
4 4 3
4 8 1
10 3 2
  
```



7 1
1 1 125

Sample Output

2
2
1
3
3
18
15
5
13
4031