Lazy functional languages like Haskell and Miranda support features that are not found in other programming languages, including infinite lists. Consider the following simple (and useful) recursive declaration:

```
letrec
  count n = cons n (count (n+1))
in
  count 0
```

The function `cons` *cons*tructs lists, so the above declaration creates the following structure:

```
  cons 0 (count 1)
= cons 0 (cons 1 (count 2))
= cons 0 (cons 1 (cons 2 ...))
= [0,1,2,...]
```

Lazy languages can do this because they only evaluate expressions that are actually used. If a program creates an infinite list and only looks at items 2 and 3 in it, the values in positions 0 and 1 are never evaluated and the list structure is only evaluated so far as the fourth node.

It is also possible to use more than one function to build an infinite list. Here is a declaration that creates the list `["even","odd","even",...]`:

```
letrec
  even = cons "even" odd
  odd = cons "odd" even
in
  even
```

There are also functions that manipulate infinite lists. The functions `take` and `drop` can be used to remove elements from the start of the list, returning the (removed) front elements or the remainder of the list, respectively. Another useful function is `zip`, which combines two lists like the slider on a zipper combines the teeth. For example,

```
zip (count 0) (count 10) = [0,10,1,11,2,12,...]
```

Your task is to implement a subset of this functionality.

Input

The first line of the input is an integer N, then a blank lsne followed by N datasets. There is a blank line between datasets.

The first line of input consists of two positive integers, n and m. n is the number of declarations to follow and m is the number of test cases.

Each declaration takes the form '*name* = *expr*'. There are two forms for *expr* : `zip` *name*1 *name*2 and x_0 x_1 $\ldots x_i$ *name*3. In the first case, *name* is the result of zipping *name*1 and *name*2 together. The other case defines the first $i + 1$ non-negative integers in the list *name* (where i is at least 0) and *name*3 is the name of the list that continues it (mandatory — all lists will be infinite).

The test cases take the form *name* s e, where s and e are non-negative integers, $s \leq e$ and $e - s < 250$.

No line of input will be longer than 80 characters. Names consist of a single capital letter.

Output

For each test case, print the integers in positions s to e of the list *name*. List elements are numbered starting with 0.

Print a blank line between datasets.

Sample Input

```
1

5 3
S = 4 3 2 1 A
O = 1 O
E = 0 E
A = zip E O
Z = zip Z S
A 43455436 43455438
S 2 5
Z 1 10
```

Sample Output

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