General Note:

- Read and understand the question carefully.
- For implementation, you are permitted to use the code that you have submitted as an assignment.
- You are not permitted to use global variables and/or static variables.
- Assume that all the inputs in the test cases are valid.

1. In a public library, computer science books are arranged in two bookshelves, each having n slots, numbered from 0 to $n-1$. As there are many number of books, librarian asks your help to build an application to find the slot in which a particular book should be placed.

   A book is assigned with a unique book code $bcode$ and a category number cno. The slots of a book in the first and the second shelves are calculated, respectively, as follows:

   - $slot\_1$ = cno^2 mod n
   - $slot\_2$ = $\lceil cno/n \rceil$ mod n

   The application should place a new book in the shelves by following the steps below.

   - A new book is always placed in its $slot\_1$ in the first shelf.
   - While placing a book B_1 in a shelf at its slot s, if s is already occupied by another book B_2, replace B_2 with B_1 and place B_2 in its slot in the other shelf.
   - Continue finding a slot alternately in the shelves until a free slot is found in either of the bookshelves, or until m number of successive replacements happen.
   - After m successive replacements, if the last calculated slot $slot\_i$ in shelf i is not free, place the book in the next free slot available in shelf i. If there are no free slots available after $slot\_i$ in shelf i, search for a free slot from the beginning of shelf i.
   - If there are no free slots available in that shelf, discard the book and end the process.

   Given the details of the books, and the maximum possible replacements m, write a program to place each book in their respective shelves. Your program should implement the following functions as per the given function prototypes:

   - $main()$: Repeatedly read a character 'r' or 'p' from the console and perform the corresponding operations given in the section Input/Output Format, using the following functions, until character 't' is encountered.
   - $find\_slot1(c, n)$: Find and return the slot for the book with $cno = c$ in the first shelf with n slots. [0.5 Marks]
   - $find\_slot2(c, n)$: Find and return the slot for the book with $cno = c$ in the second shelf with n slots. [0.5 Marks]
   - $place\_book(S1, S2, B, n, m)$: Given the maximum possible replacements m and a new book B, place B in one of the two shelves $S1$ or $S2$, each with n slots, by following the steps given above. [3 Marks]
   - $print\_shelf(S, n)$: Print the book codes of all the books placed in the shelf S with n slots, in the order of slots, separated by a space. Print "NIL" if a slot is empty. [1 Mark]

Input/Output Format

The input consists of multiple lines. First line of the input contains two integers $n \in [1, 10^4]$ and $m \in [1, 10^3]$ representing the number of slots in the book shelves and the maximum number of replacements that can be performed, respectively.

Each subsequent line starts with a character from $\{r, p, t\}$ followed by zero or one string and/or integers.

- Character 'r' : Character 'r' will be followed by a string of maximum length 10 representing the book code and an integer $x \in [1, 10^3]$ representing the category number of a book. Place the book in a shelf using $place\_book()$ function.
- Character 'p' : Character 'p' will be followed by an integer $x \in \{1, 2\}$. If $x = 1$, print the book codes of all the books in the first shelf, and if $x = 2$, print the book codes of all the books in the second shelf, using $print\_shelf()$ function.
- Character 't' : Terminate the program.

Sample Input and Output

Input 1

```
4 2
r AB01 1
r AB06 2
r AB09 4
r AB77 7
p 1
p 2
r BA45 22
p 1
p 2
t
```

Output 1

```
AB09 AB77 NIL NIL
NIL AB01 AB06 NIL
BA45 AB77 NIL NIL
NIL AB09 AB06 AB01
```

Input 2

```
5 4
p 1
p 2
r CS100 5
r EC56 6
r CE12 12
p 1
p 2
r BT10 10
```

```
p 1
p 2
r ME18 2
r MS18 8
p 1
p 2
t
```

Output 2

```
NIL NIL NIL NIL NIL
NIL NIL NIL NIL NIL
CS100 EC56 NIL NIL CE12
NIL NIL NIL NIL NIL
BT10 EC56 NIL NIL CE12
NIL CS100 NIL NIL NIL
CS100 EC56 NIL NIL MS18
NIL ME18 BT10 CE12 NIL
```