TLE '17 Contest 3 P6 - Donut Coupons

The MacFax Donut Cafe is expanding its restaurants into Canada. To kickstart their operations, they decided to open up a restaurant on every intersection along Yonge Street. Yonge Street is one of the longest streets in the world, and is composed of N intersections, beginning at Toronto's lakeshore with index 1 and ending near Lake Simcoe with index N. To simplify, each restaurant will be numbered the same as the intersection they are on. The company wants to celebrate their openings with a series of promotions, which they will announce on live television, each promotion consists of one of two events:

*The MacFax Donut Cafe is **not** endorsed by Fax McClad!*

1. Add $1^k, 2^k, 3^k \dots (r-l+1)^k$ free donut coupons to the stores $l, l+1, l+2 \dots r$ in that order.
2. Ask the audience to count the total number of coupons that have been placed in the stores $l, l+1, l+2 \dots r$ modulo 10^9+7.

Since none of the other eager customers realize that they can use a computer program to find the answer, you try to code your program quickly before the game starts so you can win all the prizes.

Constraints

For all subtasks:

$1 \leq N, Q, K^5 \leq 10^5$

$1 \leq l \leq r \leq N$

Subtasks

Subtask	Constraint	Points
1	$N, Q \leq 10^3$	10
2	$K = 0$	15
3	$K \leq 1$	20
4	No additional constraints	55

Input Specifications

The first line will contain N and Q.

Q lines of input follow in one of the following formats:

1. `U l r k` Add free donut coupons to the stores $l, l+1, l+2 \ldots r$ as described above.
2. `Q l r` Find the total number of free donut coupons added to the stores $l, l+1, l+2 \ldots r$ modulo 10^9+7.

Output Specifications

For each `Q` type query, print the answer modulo 10^9+7 on a new line.

Sample Input 1

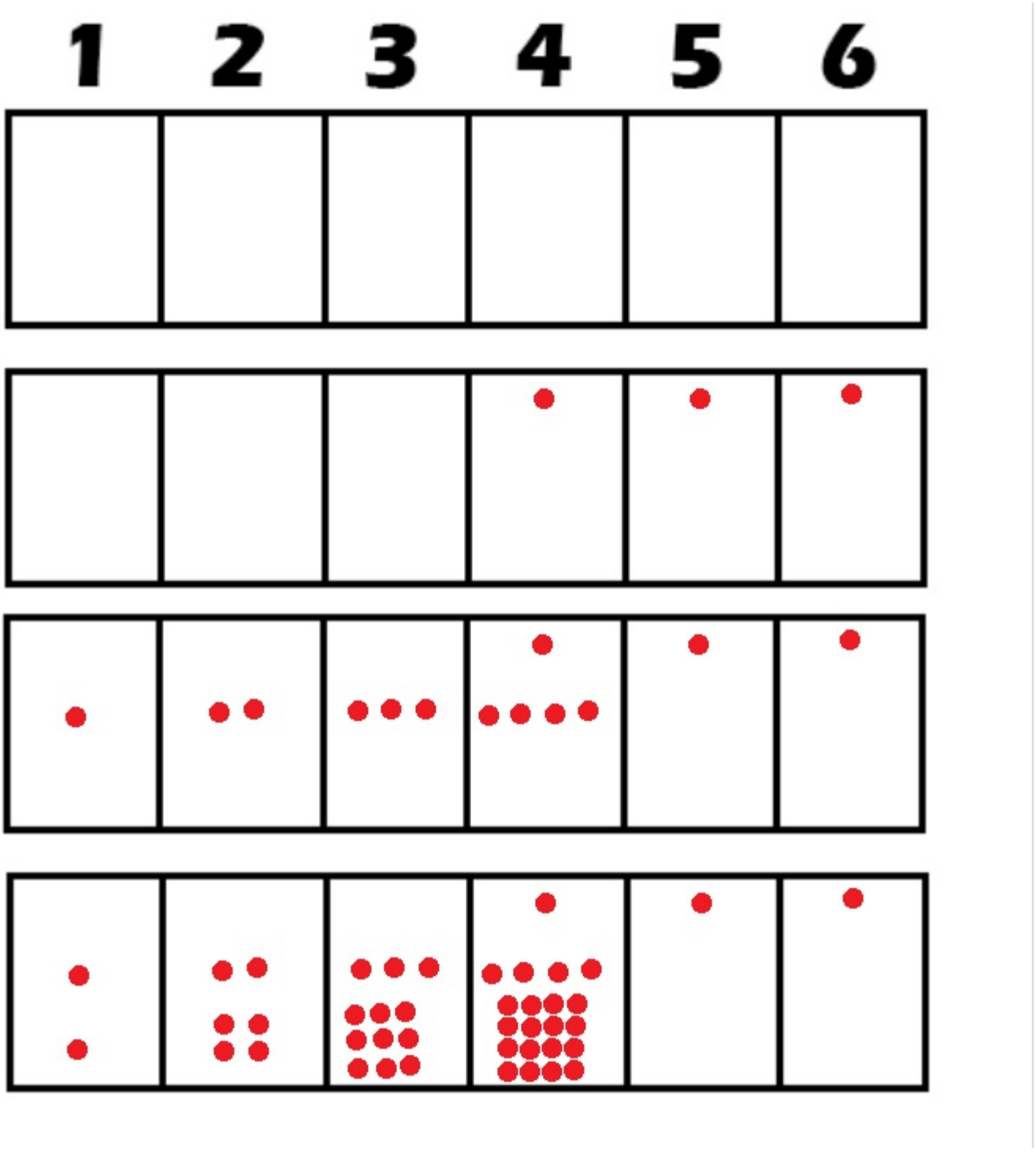
```
6 6
U 4 6 0
Q 4 5
U 1 4 1
Q 1 4
U 1 4 2
Q 4 4
```

Sample Output 1

```
2
11
21
```

Sample Explanation 1

The various stages of updates



Sample Input 2

```
10 11
U 1 10 5
Q 1 1
Q 2 2
Q 3 3
Q 4 4
Q 5 5
Q 6 6
Q 7 7
Q 8 8
Q 9 9
Q 10 10
```

Sample Output 2

```
1
32
243
1024
3125
7776
16807
32768
59049
100000
```

Sample Explanation 2

OEIS Pattern A000584