

# CCO '14 - Werewolf

---

## Canadian Computing Olympiad: 2014 Day 1, Problem 3:

As they usually do,  $N$  robots are playing the game of Werewolf, and the robots are numbered with integers from 1 to  $N$ . Exactly  $W$  of these robots are werewolves, and the remainder are civilians. Though the game of Werewolf involves various aspects, we will focus on a single discussion phase of the game.

Robots accuse other robots of being werewolves and defend other robots by vouching for their innocence.

The werewolves know each other's identities and:

- A werewolf never accuses another werewolf;
- Any robot that a werewolf defends is another werewolf.

Civilians may accuse or defend either type of robot.

Additional constraints to make our task a bit easier:

- No robot is both accused and defended.
- No robot is accused or defended more than once.
- For a robot  $A$  to accuse or defend a robot  $B$ , then  $A < B$ .

You will be given all the accusations and defenses between  $N$  robots where there are exactly  $W$  werewolves. A role assignment identifies each of the robots as either werewolf or civilian. Your goal is to figure out how many role assignments satisfy all the above constraints.

## Input Specification

---

The first line contains three numbers (each separated by one space):

- $N$  ( $1 \leq N \leq 200$ ), the number of robots, followed by
- $W$  ( $0 \leq W \leq N$ ), the number of werewolves, followed by
- $M$  ( $0 \leq M \leq N$ ), the number of accusations/defenses.

The next  $M$  lines give the accusations and defenses. Each of these lines will be one of the following two forms:

- $A\ a\ b$  indicates that robot  $a$  accused robot  $b$  of being a werewolf;
- $D\ a\ b$  indicates that robot  $a$  defended robot  $b$ .

You may assume that for 20% of the marks for this problem,  $N \leq 20$ .

## Output Specification

---

Output the number of role assignments that are consistent with the given information. Since this number may be very large, you must output this answer module  $10^9 + 7$ .

## Sample Input 1

---

```
2 1 1
D 1 2
```

## Output for Sample Input 1

---

```
1
```

## Explanation of Output for Sample Input 1

---

If robot 1 is a werewolf, then robot 2 must also be, which is too many werewolves! The only possibility is that robot 2 is the sole werewolf.

## Sample Input 2

---

```
2 1 0
```

## Output for Sample Input 2

---

```
2
```

## Explanation of Output for Sample Input 2

---

With no information, either robot 1 or robot 2 could have been a werewolf.

## Sample Input 3

---

```
3 2 2
A 1 2
D 1 3
```

## Output for Sample Input 3

---

2

## Explanation of Output for Sample Input 3

---

Either robot 1 is a werewolf, which implies robot 2 is a civilian and robot 3 is a werewolf as well, or robot 1 is a civilian (which allows robot 2 and 3 to both be werewolves).