Problem 127: Diode Dance

Difficulty: Hard

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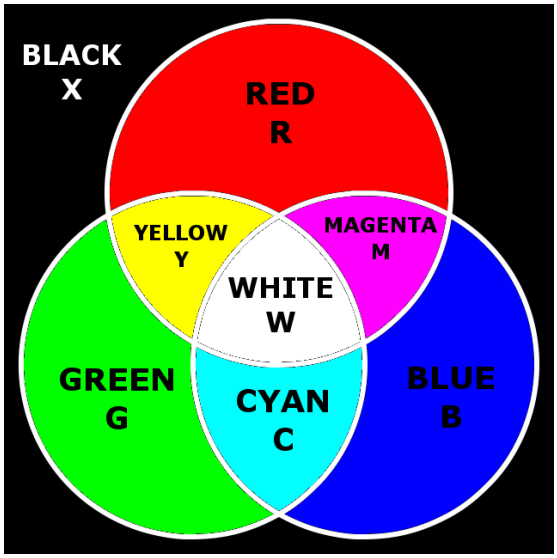
Problem Background



Light-Emitting Diodes (LEDs) are increasingly common for all sorts of lighting purposes. They're extremely energy efficient, last much longer than incandescent or florescent light sources, and can be built to display a wide range of colors. Most commonly, they're designed to display red, green, or blue light. When two diodes of different colors are placed next to each other and lit up together, the light "combines" to create additional colors. Many modern displays for televisions and computers pack together millions of red, green, and blue LEDs to create every possible color.

Amongst the other advantages LEDs offer, they're small enough that they can be integrated into computing circuits, making it easy for computer programmers like yourselves to create programmable light displays.

Problem Description

You're working on a small programmable strip of LED clusters. Each cluster in the strip contains a red, a green, and a blue LED, which can each be individually controlled. The clusters are built tightly enough that activating multiple LEDs creates different colors:

- If no LEDs are lit, the cluster appears black (represented with an X)
- If one LED is lit, the cluster appears either red (R), green (G), or blue (B), depending on the LED
- If two LEDs are lit, the cluster appears either yellow (red and green, Y), cyan (green and blue, C), or magenta (red and blue, M)
- If all three LEDs are lit, the cluster appears white (W)

Your program will control the colors displayed by each cluster of LEDs. Initially, each cluster will be turned off (black) or will display one of the primary colors (red, green, or blue). Every second, the strip will shift some of these colors forward or backward on the strip, allowing the colors to combine in various patterns. When a color reaches the end of the strip, it will "bounce back" and start moving in the other direction.

For example, consider a small strip of five clusters. Initially, cluster 0 will be red, moving to the right, and cluster 4 will be green, moving to the left.

After one second, the colors will move for the first time. The red color from cluster 0 moves to the right (to cluster 1), and the green color from cluster 4 moves left (to cluster 3). The strip now appears as shown below.

After the next shift, the red and green colors are both located on cluster 2. Red and green combine to create a yellow light.

After the third shift, the red and green colors separate again, moving to clusters 3 and 1, respectively. They will continue to move outward until they reach the edge of the strip, after which point they will rebound and move inward again.

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include:

- A line containing three positive integers, separated by a space
  - The first integer, W, represents the number of LED clusters in the light strip
  - The second integer, X, represents the number of LED clusters that are initially lit
  - The third integer, S, represents the number of seconds over which the light strip should run, with lights moving every second
- X lines containing information about the initially lit LED clusters, including the following values, separated by spaces:
  - An uppercase letter R, G, or B, indicating if the cluster is red, green, or blue (respectively)
  - A non-negative integer representing the index number of the cluster (the left-most cluster is index 0; the right-most is index W-1)
  - A number indicating the direction in which this color will "move" initially:
    - 1 indicates the color moves to the right

- 0 indicates the color is stationary and does not move
- -1 indicates the color moves to the left

Remember that colors reverse direction upon reaching the end of the strip.

```
2
5 3 5
R 0 1
B 2 0
G 4 -1
9 6 9
R 0 1
R 1 1
G 2 1
G 3 1
B 4 1
B 5 1
```

Sample Output

For each test case, your program must output S+1 lines, each representing the state of the light strip after each second, starting with the initial state. Lines should contain W uppercase letters, representing the color of each LED cluster in the strip from left to right. The letters used to represent each color are indicated in the description above.

```
RXBXG
XRBGX
XXWXX
XGBRX
GXBXR
XGBRX
RRGGBBXXX
XRRGGBBXX
XXRRGGBBX
XXXRRGGBB
XXXXRRGCB
XXXXXRMCG
XXXXXBMYG
XXXXBBGYR
XXXBBGGRR
XXBBGGRRX
```