02. Conditional Statements

Conditional statements
- if
- else if
- switch-case
- nested conditional statements

Exercise 1: Day of the week

Exercise 2: Paint fence

Exercise 3: Valleys

Exercise 4: billboard (Dec 2017)

Exercise 5: Hoof paper scissors (Jan 2017)

Exercise 6: Revegetate (Feb 2019)

Day of the week

Given a date, find the day of the week. Note that 01/01/2022 is Saturday.

Input (from terminal / stdin)

- The only line contains integers m and d, indicating the month m and the day d in 2022. Assume the input is valid.

Output (to terminal / stdout)

- Report the day of the week for day m/d/2022.

Sample input
6 20

Sample output
Monday

Paint fence

Bessie has painted two intervals $[x_1, y_1]$ and $[x_2, y_2]$ along the 1D fence. Please determine the total length of fence that is now covered with paint.

INPUT (from terminal / stdin)

- The first line of the input contains the integers x_1 and y_1, separated by a space ($x_1 < y_1$).
- The second line contains integers x_2 and y_2, separated by a space ($x_2 < y_2$).
- All these integers lie in the range [0 ... 100], inclusive.

OUTPUT (to terminal / stdout)

- Please output the total length of the fence covered with paint once, and the length of the fence covered with paint twice.

SAMPLE INPUT:
7 10
4 8

SAMPLE OUTPUT:
5
1

Here, 5 total units of fence are covered with paint once, from x=4 to x=7 and [7, 10], 1 unit of the fence has been painted twice.

T&D: How about working with three intervals?

Valleys

Given an array of integers, count the number of valleys. A valley is defined as a location of the array where the value is the smallest in a neighborhood and there are values strictly larger to the left and to the right in the neighborhood.

Input (from terminal / stdin)

- The first line contains integer N, $1 \leq N \leq 1000$.
- The second line contains the N integers, all in the range [0, 1000].

Output (to terminal / stdout)

- Report the number of valleys in the array.

Sample input
6
3 3 5 2 4 3

Sample output
1

Only integer 2 at position 4 is a valley, but the second 3 is not a valley since there is no value larger than 3 exists to the left.

Billboard (Dec 2017)

During long milking sessions, Bessie the cow likes to stare out the window of her barn at two huge rectangular billboards across the street advertising "Farmer Alex's Amazingly Appetizing Alfalfa" and "Farmer Greg's Great Grain". Pictures of these two cow feed products on the billboards look much tastier to Bessie than the grass from her farm.

One day, as Bessie is staring out the window, she is alarmed to see a huge rectangular truck parking across the street. The side of the truck has an advertisement for "Farmer Smith's Superb Steaks", which Bessie doesn't quite understand, but she is mostly concerned about the truck potentially blocking the view of her two favorite billboards.

Given the locations of the two billboards and the location of the truck, please calculate the total combined area of both billboards that is still visible. It is possible that the truck obscures neither, both, or only one of the billboards.

INPUT FORMAT (file billboard.in):

- The first line of input contains four space-separated integers: $x_1\ y_1\ x_2\ y_2$, where (x_1, y_1) and (x_2, y_2) are the coordinates of the lower-left and upper-right corners of the first billboard in Bessie's 2D field of view.
- The next line contains four more integers, similarly specifying the lower-left and upper-right corners of the second billboard.
- The third and final line of input contains four integers specifying the lower-left and upper-right corners of the truck.
- All coordinates are in the range -1000 to +1000. The two billboards are guaranteed not to have any positive area of overlap between themselves.

OUTPUT FORMAT (file billboard.out):

- Please output the total combined area of both billboards that remains visible.

SAMPLE INPUT:
1 2 3 5
6 0 10 4
2 1 8 3

SAMPLE OUTPUT:
17

Here, 5 units of area from the first billboard and 12 units of area from the second billboard remain visible.

Hoof paper scissors (Jan 2017)

You have probably heard of the game "Rock, Paper, Scissors". The cows like to play a similar game they call "Hoof, Paper, Scissors".

The rules of "Hoof, Paper, Scissors" are simple. Two cows play against each-other. They both count to three and then each simultaneously makes a gesture that represents either a hoof, a piece of paper, or a pair of scissors. Hoof beats scissors (since a hoof can smash a pair of scissors), scissors beats paper (since scissors can cut paper), and paper beats hoof (since the hoof can get a papercut). For example, if the first cow makes a "hoof" gesture and the second a "paper" gesture, then the second cow wins. Of course, it is also possible to tie, if both cows make the same gesture.

Farmer John watches in fascination as two of his cows play a series of N games of "Hoof, Paper, Scissors" ($1 \leq N \leq 100$). Unfortunately, while he can see that the cows are making three distinct types of gestures, he can't tell which one represents "hoof", which one represents "paper" and which one represents "scissors" (to Farmer John's untrained eye, they all seem to be variations on "hoof"...)

Not knowing the meaning of the three gestures, Farmer John assigns them numbers 1, 2, and 3. Perhaps gesture 1 stands for "hoof", or maybe it stands for "paper"; the meaning is not clear to him. Given the gestures made by both cows over all N games, please help Farmer John determine the maximum possible number of games the first cow could have possibly won, given an appropriate mapping between numbers and their respective gestures.

INPUT FORMAT (file hps.in):

- The first line of the input file contains N.
- Each of the remaining N lines contain two integers (each 1, 2, or 3), describing a game from Farmer John's perspective.

OUTPUT FORMAT (file hps.out):

- Print the maximum number of games the first of the two cows could possibly have won.

SAMPLE INPUT:
5
1 2
2 2
1 3
1 1
3 2

SAMPLE OUTPUT:
2

One solution (of several) for this sample case is to have 1 represent "scissors", 2 represent "hoof", and 3 represent "paper". This assignment gives 2 victories to the first cow ("1 3" and "3 2"). No other assignment leads to more victories.

Revegetate (Feb 2019)

A lengthy drought has left Farmer John's N pastures devoid of grass. However, with the rainy season arriving soon, the time has come to "revegetate".

In Farmer John's shed, he has four buckets, each with a different type of grass seed. He wishes to sow each pasture with one of these types of seeds. Being a dairy farmer, Farmer John wants to make sure each of his cows has a varied diet. Each of his M cows has two favorite pastures, and he wants to be sure different types of grass are planted in each, so every cow can choose between two types of grass. Farmer John knows that no pasture is a favorite of more than 3 cows.

Please help Farmer John choose a grass type for each pasture so that the nutritional needs of all cows are satisfied.

INPUT FORMAT (file revegetate.in):

- The first line of input contains N $(2 \leq N \leq 100)$ and M $(1 \leq M \leq 150)$.
- Each of the next M lines contains two integers in the range $1 \ldots N$, describing the pair of pastures that are the two favorites for one of Farmer John's cows.

OUTPUT FORMAT (file revegetate.out):

- Output an N-digit number, with each digit in the range 1…4, describing the grass type to be planted in each field. The first digit corresponds to the grass type for field 1, the second digit to field 2, and so on. If there are multiple valid solutions, print only the N-digit number that is smallest among all of them.

SAMPLE INPUT:
5 6
4 1
4 2
4 3
2 5
1 2
1 5

SAMPLE OUTPUT:
12133