Exercises: Working with Abstraction

This document defines the exercises for "Java Advanced" course @ Software University. Please submit your solutions (source code) of all below described problems in Judge.

Problem 1. Card Suit

Create an **enumeration type** that has as its constants the **four suits** of a deck of playing cards (CLUBS, DIAMONDS, HEARTS, SPADES). Iterate over the values of the enumeration type and print all **ordinal values** and **names**.

Examples

Input	Output

`Card Suits`	`Card Suits:`
	`Ordinal value: 0; Name value: CLUBS`
	`Ordinal value: 1; Name value: DIAMONDS`
	`Ordinal value: 2; Name value: HEARTS`
	`Ordinal value: 3; Name value: SPADES`

Problem 2. Card Rank

Create an **enumeration type** that has as its constants the **fourteen ranks** of a deck of playing cards (ACE, TWO, THREE, FOUR, FIVE, SIX, SEVEN, EIGHT, NINE, TEN, JACK, QUEEN, KING). Iterate over the values of the enumeration type and print all ordinal values and names.

Examples

Input	Output

`Card Ranks`	`Card Ranks:`
	`Ordinal value: 0; Name value: ACE`
	`Ordinal value: 1; Name value: TWO`
	`Ordinal value: 2; Name value: THREE`
	`Ordinal value: 3; Name value: FOUR`
	`Ordinal value: 4; Name value: FIVE`
	`Ordinal value: 5; Name value: SIX`
	`Ordinal value: 6; Name value: SEVEN`
	`Ordinal value: 7; Name value: EIGHT`
	`Ordinal value: 8; Name value: NINE`
	`Ordinal value: 9; Name value: TEN`
	`Ordinal value: 10; Name value: JACK`
	`Ordinal value: 11; Name value: QUEEN`
	`Ordinal value: 12; Name value: KING`

Problem 3. Cards with Power

Create a program that generates a **deck of cards (class Card)** which have a power. The power of a card is calculated by **adding** the power of its rank plus the power of its suit.

Rank powers are as follows: (ACE - 14, TWO - 2, THREE - 3, FOUR - 4, FIVE - 5, SIX - 6, SEVEN - 7, EIGHT - 8, NINE - 9, TEN - 10, JACK - 11, QUEEN - 12, KING - 13).

Suit powers are as follows: (CLUBS - 0, DIAMONDS - 13, HEARTS - 26, SPADES - 39).

You will get a command consisting of **two** lines. On the **first** line you will receive the Rank of the card and on the **second** line you will get the suit of the card.

Print the output in the **format** "`Card name: ACE of SPADES; Card power: 53`".

Note

Try using the enumeration types you have created in the previous problems but extending them with constructors and methods. Try using the `Enum.valueOf()`.

Examples

Input	Output
`TWO` `CLUBS`	`Card name: TWO of CLUBS; Card power: 2`
`ACE` `SPADES`	`Card name: ACE of SPADES; Card power: 53`

Problem 4. Traffic Lights

Implement a simple state machine in the form of a traffic light. Every traffic light has **three** possible signals - **red**, **green** and **yellow**. Each traffic light can be **updated**, which changes the color of its signal (e.g. if it is currently red, it changes to green, if it is green it changes to yellow). The order of signals is **red -> green -> yellow -> red** and so on.

On the first line you will be given multiple traffic light signals in the **format** "RED GREEN YELLOW". They may be 3, **more** or **less** than 3. You need to make as many traffic lights as there are signals in the input.

On the second line, you will receive the **n** number of times you need to change each traffic light's signal.

Your output should consist of **n** number of lines, including **each** updated traffic light's signal. To better understand the problem, see the example below.

Examples

Input	Output

`GREEN RED YELLOW`
`4`
	`YELLOW GREEN RED`
	`RED YELLOW GREEN`
	`GREEN RED YELLOW`
	`YELLOW GREEN RED`

Exercises: Working with Abstraction

In this section your job is to download source code for every problem and **refactor** it.

Problem 5. Jedi Galaxy

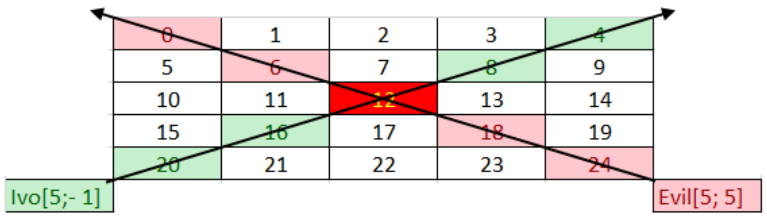
Pesho is Jedi and so he starts gathering stars to grow stronger.

His galaxy is represented as a two-dimensional array. Every cell in the matrix is a star that has a **value**. Ivo starts at the given **col** and **row**. He can move only on the diagonal **from the lowest left to the upper right**, and **adds** to his score all the stars (values) from the cells he **passes through**. Unfortunately, there is always an Evil power that tries to prevent his success.

Evil power starts at the given **row** and **col** and instantly destroys all stars on the opposite diagonal – **From lowest right to the upper left.**

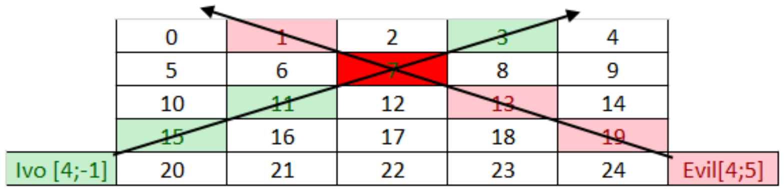
Ivo **adds** the values only of the stars that are **not destroyed** by the evil power.

You will receive **two** integers, separated by space, which represent the two dimensional array - the first being the rows and the second being the columns. Then, you must fill the two dimensional array with increasing integers starting from 0, and continuing on every row, like this:
first row: 0, 1, 2… m
second row: n+1, n+2, n+3… n + n.



Example:

Ivo starts with coordinates row = 5, col = -1. He must collect all stars with value [20, 16, 12, 8, 4]. Evil starts with coordinates row = 5, col = 5. The Evil destroys all stars in range [24, 18, 12, 6, 0]. The star with value **12** is the cross point for Ivo and The Evil, so Ivo skips the stars and collects only these who are not in the evil range.



You will also receive multiple pairs of commands in the form of 2 integers separated by a single space. The first two integers will represent Ivo's start coordinates. The second one will represent the Evil Power's start coordinates.

The input ends when you receive the command "**Let the Force be with you**". When that happens, you must print the value of all stars that Ivo has collected successfully.

Input

- On the first line, you will receive the number **N**, **M** -> the dimensions of the matrix. You must then fill the matrix according to these dimensions.
- On the next several lines you will begin receiving **2** integers separated by a single **space**, which represent Ivo's **row** and **col**. On the next line you will receive the Evil Power's **coordinates**.
- There will always be **at least 2 lines** of input to represent at least 1 path of Ivo and the Evil force.
- When you receive the command, "**Let the Force be with you**" the input ends.

Output

- The output is simple. Print the sum of the values from all stars that Ivo has collected.

Constraints

- The dimensions of the matrix will be **integers** in the **range [5, 2000].**
- The given rows will be valid **integers** in the **range [0, 2000].**
- The given columns will be valid **integers** in **the range** $[-2^{31} + 1, 2^{31} - 1]$.

Input	Output

`5 5`
`5 -1`
`5 5`
`Let the Force be with you`
	48

`5 5`
`4 -1`
`4 5`
	29

`Let the Force be with you`	

Problem 6. Greedy Times

Finally, you have unlocked the safe and reached the treasure! Inside there are all kinds of gems, cash in different currencies and gold bullions. Next to you there is a bag which unfortunately has a limited space. You don't have much time so you need to take as much wealth as possible! But in order to get a bigger amount of the most valuable items, you need to keep the following rules:

- The **gold amount** in your bag should **always be more** than **or equal** to the **gem amount** at **any** time
- The **gem amount** should **always be more** than **or equal** to the **cash amount** at **any** time

If you read an **item** which **breaks** one of **these rules** you **should not put** it in the **bag**. You should **always** be careful **not** to **exceed** the overall **bag's capacity,** because it will tear down and you will **lose** everything! You will receive the **content of** the **safe** on a **single line** in the **format** "**item quantity**" pairs, separated by **whitespace**. You need to gather **only three types** of items:

- Cash - All **three letter** items
- Gem - All **items** which **end** on "**Gem**" (at least 4 symbols)
- Gold - this type has **only one item** with the name - "**Gold**"

Each **item** which **does not** fall **in** one of the **above categories** is **useless** and you should **skip it**. Reading item's **names** should be **CASE-INSENSITIVE**. You should **aggregate item's quantities** which have the **same name**.

If you've kept the rules you should escape successfully with a bag full of wealth. Now it's time to review what you have managed to get out of the safe. **Print all** the **types** ordered by **total amount** in **descending order**. Inside a type, **order** the **items** first **alphabetically** in **descending** order and **then by** their **amount** in **ascending** order. Use the format described below for each type.

Input

- On the **first line**, you will receive a **number** which represents the **capacity** of the **bag**
- On the **second line**, you will receive a **sequence** of **item and quantity** pairs

Output

Print **only** the **types** from which you **have items in the bag** ordered by **`Total Amount`** **descending**. Inside a type order the **items first alphabetically** in **descending** order and **then** by **amount** in **ascending order**. Use the following format for each type:

`"<{type}> ${total amount}"`

`"##{item} - {amount}"` - each item on new line

Constraints

- Bag's **max capacity** will **always** be a **positive number**
- All **quantities** will be **positive integer** in the **range [0 … 2100000000]**
- Each item of type **gem** will have a **name** - **at least 4** symbols
- Time limit: 0.1 sec. Memory limit: 16 MB

Examples

Input	Output

`150`
`Gold 28 Rubygem 16 USD 9 GBP 8`
	`<Gold> $28`
	`##Gold - 28`
	`<Gem> $16`
	`##Rubygem - 16`
	`<Cash> $9`
	`##USD - 9`

`24000010`
`USD 1030 Gold 300000 EmeraldGem 900000 Topazgem 290000 CHF 280000 Gold 10000000 JPN 10000 Rubygem 10000000 KLM 3120010`
	`<Gold> $10300000`
	`##Gold - 10300000`
	`<Gem> $10290000`
	`##Topazgem - 290000`
	`##Rubygem - 10000000`
	`<Cash> $3410010`
	`##KLM - 3120010`
	`##JPN - 10000`
	`##CHF - 280000`

`80345`
`RubyGem 70000 JAV 10960 Bau 60000 Gold 80000`
	`<Gold> $80000`
	`##Gold - 80000`

`90000000000`
`Gold 0     BitCoinGem 0 USD 0`
	`<Gold> $0`
	`##Gold - 0`
	`<Gem> $0`
	`##BitCoinGem - 0`
	`<Cash> $0`
	`##USD - 0`