Exercises: Working with Abstraction

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

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

2. Card Rank

Create an **enumeration type** that has as its constants the **thirteen 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

3. Cards with Power

Create a program that generates a **deck of cards (class Card)** that have 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: {card name} of {suit name}; Card power: {power of rank + power of suit}`**".

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

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
RED RED RED GREEN GREEN GREEN 6	GREEN GREEN GREEN YELLOW YELLOW YELLOW YELLOW YELLOW YELLOW RED RED RED RED RED RED GREEN GREEN GREEN GREEN GREEN GREEN YELLOW YELLOW YELLOW YELLOW YELLOW YELLOW RED RED RED RED RED RED GREEN GREEN GREEN

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

5. Jedi Galaxy

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

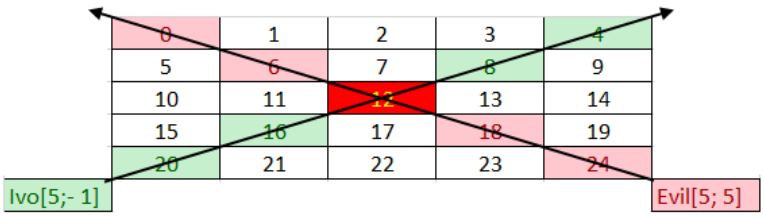
His galaxy is represented as a two-dimensional array. Every cell in the matrix is a star that has a **value**. Peter starts at the given **col** and **row**. He can move only on the diagonal **from the lowest left to the upper right** and **adds** to his score all the stars (values) from the cells he **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 the lowest right to the upper left.**

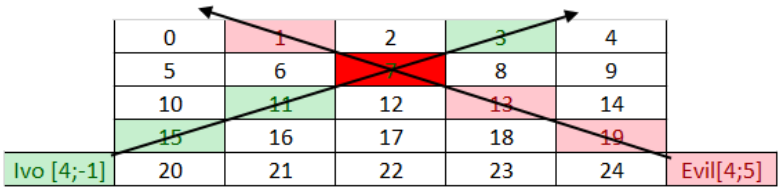
Peter **adds** the values only of the stars that are **not destroyed** by the evil power.

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:



Peter 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. Evil destroys all-stars in the range [24, 18, 12, 6, 0]. The star with a value of **12** is the cross point for Peter and The Evil, so Peter skips the stars and collects only those 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 Peter'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 Peter 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 Peter'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 Peter 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 Peter 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 Let the Force be with you	29

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 limited space. You don't have much time so you need to take as much wealth as possible! But 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** that **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** that **does not** fall **in** one of the **above categories** is **useless** and you should **skip it**. Reading item's **names** should be **CASE-INSENSITIVE, except** when the **item is Cash**. You should **aggregate items' quantities** that 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 the **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** that 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** are **first alphabetically** in **descending** order and **then** by an **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