# Programming Fundamentals Final Exam 04.04.2020

## Problem 1. Password Reset

*Yet again you have forgotten your password... Naturally it`s not the first time this has happened. Actually you got so tired of it that you decided to help yourself with a smart solution.*

Write a password reset program that performs a series of commands upon a predefined string. First, you will receive a string and afterwards, until the command "**Done**" is given, you will be receiving strings with commands split by a single space. The commands will be the following:

* TakeOdd
  + Takes only the characters at **odd** **indices** and **concatenates** them together to  
    obtain the **new raw password** and then **prints** it.
* Cut {index} {length}
  + Gets the substring with the **given length** starting from the **given index** from the password and removes its first occurrence of it, then prints the password on the console.
  + The given index and length will **always** be **valid**.
* Substitute {substring} {substitute}
  + If the raw password contains the given substring, replaces all of its   
    occurrences with the substitute text given and prints the result.
  + If it doesn’t, prints "Nothing to replace!"

### Input

* You will be receiving strings until the "**Done**" command is given.

### Output

* After the "Done" command is received, print:
  + "Your password is: {password}"

### Constraints

* The indexes from the "**Cut {index} {length}**" command will always be valid.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Siiceercaroetavm!:?:ahsott.:i:nstupmomceqr  TakeOdd  Cut 15 3  Substitute :: -  Substitute | ^  Done | icecream::hot::summer  icecream::hot::mer  icecream-hot-mer  Nothing to replace!  Your password is: icecream-hot-mer |
| **Comments** | |
| TakeOdd  Siiceercaroetavm!:?:ahsott.:i:nstupmomceqr -> icecream::hot::summer  We only take the chars at odd indices 1, 3, 5 etc.  **Cut 15 3 ->** icecream::hot::summer -> sum  icecream::hot::mer  We cut a substring starting at index 15 with length 3,  remove it from the raw password and print it.  Then, on a new line we print the resulting new raw password.  **Substitute :: - ->** icecream::hot::summer -> icream-hot-summer  We replace "::" with "-".  **Substitute** | ^ **->** Nothing to replace!  "|" is not found anywhere in the raw password.  Finally, after receiving the "**Done**" command, we print the resulting password in the proper format. | |
| **Input** | **Output** |
| up8rgoyg3r1atmlmpiunagt!-irs7!1fgulnnnqy  TakeOdd  Cut 18 2  Substitute ! \*\*\*  Substitute ? .!.  Done | programming!is!funny  programming!is!fun  programming\*\*\*is\*\*\*fun  Nothing to replace!  Your password is: programming\*\*\*is\*\*\*fun |

# Problem 2. Fancy Barcodes

Your first task is to determine if the given sequence of characters is a **valid** barcode or **not**.

**Each line must not contain anything else but a valid barcode**. A barcode is **valid** when:

* Is surrounded with a "@" followed by one or more "#"
* Is **at least 6 characters long** (without the surrounding "@" or "#")
* **Starts** with a **capital letter**
* Contains **only letters** (lower and upper case) **and digits**
* **Ends** with a **capital letter**

Examples of valid barcodes: @#FreshFisH@#, @###Brea0D@###, @##Che46sE@##, @##Che46sE@###

Examples of invalid barcodes: **##InvaliDiteM##**, **@InvalidIteM@**, **@#Invalid\_IteM@#**

Next you have to determine the **product group** of the item from the **barcode**. The product group is obtained by **concatenating** **all the digits** found in the barcode. If there are **no digits** present in the barcode, the **default** product group is "00".

Examples:

@#FreshFisH@# -> product group: 00

@###Brea0D@### -> product group: 0

@##Che4s6E@## -> product group: 46

### Input

On the first line you will be given an integer **n** – the count of barcodes that you will be receiving next.

On the next **n** lines, you will receive different strings.

### Output

For each barcode that you process, you need to print a message.

If the barcode is invalid:

* "Invalid barcode"

If the barcode is valid:

* "Product group: {product group}"

### Constraints

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3  @#FreshFisH@#  @###Brea0D@###  @##Che4s6E@## | Product group: 00  Product group: 0  Product group: 46 |
| **Input** | **Output** |
| 6  @###Val1d1teM@###  @#ValidIteM@#  ##InvaliDiteM##  @InvalidIteM@  @#Invalid\_IteM@#  @#ValiditeM@# | Product group: 11  Product group: 00  Invalid barcode  Invalid barcode  Invalid barcode  Product group: 00 |

## Problem 3. Heroes of Code and Logic VII

*You got your hands on the most recent update on the best MMORPG of all time – Heroes of Code and Logic. You want to play it all day long! So cancel all other arrangements and create your party!*

On the first line of the standard input you will receive an integer **n** – the number of heroes that you can choose for your party. On the next **n** lines, the heroes themselves will follow with their **hit points** and **mana points** separated by empty space in the following format:

{hero name} {HP} {MP}

* where HP stands for hit points and MP for mana points
* a hero can have a maximum of 100 HP and 200 MP

After you have successfully picked your heroes, you can start playing the game. You will be receiving different commands, each on a new line, separated by " – ", until the "End" command is given.

There are several actions that can be performed by the heroes:

CastSpell – {hero name} – {MP needed} – {spell name}

* If the hero has the required MP, he casts the spell, thus reducing his MP. Print this message:
  + "{hero name} has successfully cast {spell name} and now has {mana points left} MP!"
* If the hero is unable to cast the spell print:
  + "**{hero name} does not have enough MP to cast {spell name}!**"

TakeDamage – {hero name} – {damage} – {attacker}

* Reduce the hero HP by the given damage amount. If the hero is still alive (his HP is greater than 0) print:
  + "{hero name} was hit for {damage} HP by {attacker} and now has {current HP} HP left!"
* If the hero has died, remove him from your party and print:
  + "{hero name} has been killed by {attacker}!"

Recharge – {hero name} – {amount}

* The hero increases his MP. If a command is given that would bring the MP of the hero above **200**, MP is increased so that it reaches the **maximum**. Print the following message:
  + "{hero name} recharged for {amount recovered} MP!"

Heal – {hero name} – {amount}

* The hero increases his HP. If a command is given that would bring the HP of the hero above **100**, HP is increased so that it reaches the **maximum**. Print the following message:
  + "{hero name} healed for {amount recovered} HP!"

### Input

* On the first line of the standard input you will receive an integer **n**
* On the next **n** lines, the heroes themselves will follow with their **hit points** and **mana points** separated by empty space in the following format
* You will be receiving different **commands**, each on a new line, separated by " – ", until the "End" command is given

### Output

* Print all members of your party who are **still alive**, sorted by their **HP in descending order**, then by their **name in ascending order**, in the following format (their HP/MP need to be indented 2 spaces):

"{hero name}

HP: {current HP}

MP: {current MP}

..."

### Constraints

* The starting HP/MP of the heroes will be valid, 32-bit integers, will never be negative or exceed the respective limits.
* The HP/MP amounts in the commands will never be negative.
* The hero names in the commands will always be valid members of your party. No need to check that explicitly

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  Solmyr 85 120  Kyrre 99 50  Heal - Solmyr - 10  Recharge - Solmyr - 50  TakeDamage - Kyrre - 66 - Orc  CastSpell - Kyrre - 15 - ViewEarth  End | Solmyr healed for 10 HP!  Solmyr recharged for 50 MP!  Kyrre was hit for 66 HP by Orc and now has 33 HP left!  Kyrre has successfully cast ViewEarth and now has 35 MP!  Solmyr  HP: 95  MP: 170  Kyrre  HP: 33  MP: 35 |
| **Comments** | | |
| These are examples of successful actions. The different colors denote the commands and their respective messages. | | |
| **Input** | **Output** |
| 4  Adela 90 150  SirMullich 70 40  Ivor 1 111  Tyris 94 61  Heal - SirMullich - 50  Recharge - Adela - 100  CastSpell - Tyris - 1000 - Fireball  TakeDamage - Tyris - 99 - Fireball  TakeDamage - Ivor - 3 - Mosquito  End | SirMullich healed for 30 HP!  Adela recharged for 50 MP!  Tyris does not have enough MP to cast Fireball!  Tyris has been killed by Fireball!  Ivor has been killed by Mosquito!  SirMullich  HP: 100  MP: 40  Adela  HP: 90  MP: 200 |
| **Comments** | | |
| Heal – SirMullich healed for 30 HP due to the HP max limit.  Recharge – Adela recharged for 50 MP due to the MP max limit.  CastSpell – Tyris does not have enough MP to cast the spell.  TakeDamage – Tyris`s HP is reduced by 99, thus becoming -5, which means that he is dead.  TakeDamage – Ivor`s HP is now -2, so he is dead too.  After the "End" command we print the remaining living heroes, sorted by their HP in reverse order. | | |