Exercise: Java Basics

Problems for exercises and homework for the [“Software Technologies” course @ SoftUni]().

You can submit your solutions here: https://judge.softuni.bg/Contests/712/Java-Basics-Exercises.

Part I: Data Types and Methods

1. Variable in Hexadecimal Format

Write a program that reads a number in **hexadecimal format** convert it to **decimal format** and prints it.

Input	Output
`FE`	`254`
`37`	`55`
`10`	`16`

Hints

- Use `Integer.parseInt(string, base)`.

2. Boolean Variable

Write a program that reads a **string**, converts it to **Boolean** variable and **prints** “**Yes**” if the variable is **`true`** and “**No**” if the variable is **`false`**.

Input	Output
`True`	`Yes`
`False`	`No`

Hints

- Java has a function, which takes a **`string`** and converts it to a **`Boolean`**.

3. Reverse Characters

Write a program to ask the user for **3 letters** and print them in **reversed order**.

Examples

Input	Output
A B C	CBA

Input	Output
x Y z	zYx

Input	Output
G g n	ngG

4. Vowel or Digit

Create a program to check if given symbol is **digit**, **vowel** or any **other symbol**.

Examples

Input	Output
a	vowel

Input	Output
9	digit

Input	Output
g	other

5. Integer to Hex and Binary

Write a program to convert a **decimal number** to **hexadecimal** and **binary** number and print it.

Examples

Input	Output
10	A 1010

Input	Output
420	1A4 110100100

Input	Output
256	100 100000000

Hints

- There are built-in methods, that convert Integer to Hex and Binary.

Part II: Arrays

6. Compare Char Arrays

Write a program, which **compares** two char arrays **lexicographically** (letter by letter).

Print the them in **alphabetical order**, each on separate line.

Examples

Input	Output
a b c d e f	abc def
p e t e r a n n i e	annie peter
a n n i e a n	an annie
a b a b	ab ab

Hints

- Compare the first letter of **`arr1[]`** and **`arr2[]`**, if equal, compare the next letter, etc.
- If all letters are equal, the smaller array is the **shorter**.
- If all letters are equal and the array lengths are the same, the arrays are **equal**.

7. Max Sequence of Equal Elements

Write a program that finds the **longest sequence of equal elements** in an array of integers. If several longest sequences exist, print the leftmost one.

Examples

Input	Output
`2 1 1 2 3 3` **`2 2 2`** `1`	`2 2 2`
`1 1 1` `2 3 1 3 3`	`1 1 1`
`4 4 4 4`	`4 4 4 4`
`0` **`1 1`** `5 2 2 6 3 3`	`1 1`

Hints

- Start with the sequence that consists of the first element: **`start`**=**`0`**, **`len`**=**`1`**.
- Scan the elements **from left to right**, starting at the second element: **`pos`**=**`1`**…**`n-1`**.
  - At each step compare the current element with the element on the left:
    - Same value → you have found a sequence longer by one → **`len`**++.
    - Different value → **start a new sequence** from the **current element**: **`start`**=**`pos`**, **`len`**=**`1`**.
  - After each step remember the sequence it is found to be longest at the moment: **`bestStart`**=**`start`**, **`bestLen`**=**`len`**.
- Finally, print the longest sequence by using **`bestStart`** and **`bestLen`**.

8. Max Sequence of Increasing Elements

Write a program that finds the **longest increasing subsequence** in an array of integers. The longest increasing subsequence is a **portion of the array** (subsequence) that is strongly **increasing** and has the **longest possible length**. If several such subsequences exist, find the left most of them.

Examples

Input	Output
`3` **`2 3 4`** `2 2 4`	`2 3 4`
`4 5` **`1 2 3 4 5`**	`1 2 3 4 5`
`3 4 5 6`	`3 4 5 6`
`0 1` `1 2 2 3 3`	`0 1`

Hints

- Use the same algorithm like in the previous problem (Max Sequence of Equal Elements).

9. Most Frequent Number

Write a program that finds the **most frequent number** in a given sequence of numbers.

- Numbers will be in the range **[0…65535]**.
- In case of multiple numbers with the same maximum frequency, print the **left-most** of them.

Examples

Input	Output	Output
`4` `1 1` **`4`** `2 3` **`4 4`** `1 2` **`4`** `9 3`	`4`	`The number` **`4`** `is the most frequent (occurs 5 times)`
`2 2 2 2` `1` **`2 2 2`**	`2`	`The number` **`2`** `is the most frequent (occurs 7 times)`

`7 7 7 0 2 2 2 0 10 10 10`	`7`	`The numbers 2, 7 and 10 have the same maximal frequence (each occurs 3 times). The leftmost of them is 7.`

10. Index of Letters

Write a program that creates an array containing all letters from the alphabet (**a**-**z**). Read a lowercase word from the console and print the **index of each of its letters in the letters array**.

Examples

Input	Output

`abcz`	`a -> 0`
	`b -> 1`
	`c -> 2`
	`z -> 25`

`softuni`	`s -> 18`
	`o -> 14`
	`f -> 5`
	`t -> 19`
	`u -> 20`
	`n -> 13`
	`i -> 8`

11. Equal Sums

Write a program that determines if there **exists an element in the array** such that the **sum of the elements on its left** is **equal** to the **sum of the elements on its right**. If there are **no elements to the left / right**, their **sum is considered to be 0**. Print the **index** that satisfies the required condition or **"no"** if there is no such index.

Examples

Input	Output	Comments

`1 2 3 3`	`2`	`At a[2] -> left sum = 3, right sum = 3`
		`a[0] + a[1] = a[3]`

`1 2`	`no`	`At a[0] -> left sum = 0, right sum = 2`
		`At a[1] -> left sum = 1, right sum = 0`
		`No such index exists`

`1`	`0`	`At a[0] -> left sum = 0, right sum = 0`
`1 2 3`	`no`	`No such index exists`

`10 5 5 99 3 4 2 5 1 1 4`	`3`	`At a[3] -> left sum = 20, right sum = 20`
		`a[0] + a[1] + a[2] = a[4] + a[5] + a[6] + a[7] + a[8] + a[9] + a[10]`

12. Bomb Numbers

Write a program that **reads sequence of numbers** and **special bomb number** with a certain **power**. Your task is to **detonate every occurrence of the special bomb number** and according to its power **his neighbors from left and right**. Detonations are performed from left to right and all detonated numbers disappear. Finally print the **sum of the remaining elements** in the sequence.

Examples

Input	Output	Comments
1 2 2 4 2 2 2 9 4 2	12	Special number is **4** with power 2. After detontaion we left with the sequence [1, 2, 9] with sum 12.
1 4 4 2 8 9 1 9 3	5	Special number is **9** with power 3. After detontaion we left with the sequence [1, 4] with sum 5. Since the 9 has only 1 neighbour from the right we remove just it (one number instead of 3).
1 7 7 1 2 3 7 1	6	Detonations are performed from left to right. We could not detonate the second occurance of 7 because its already destroyed by the first occurance. The numbers [1, 2, 3] survive. Their sum is 6.
1 1 2 1 1 1 2 1 1 1 2 1	4	The red and yellow numbers disappear in two sequential detonations. The result is the sequence [1, 1, 1, 1]. Sum = 4.

Part IV: Strings, Maps and Stream API

13. Reverse String

Write a program that reads a string from the console, **reverses its letters** and **prints** the result back at the console.

Examples

Input	Output
sample	elpmas
24tvcoi92	29iocvt42

Hints

- **Variant I**: convert the string to **char array**, **reverse** it, then convert it to **string** again.
- **Variant II**: print the letters of the string right-to-left in a `for`-loop.

14. Fit String in 20 Chars

Write a program that **reads** from the console a string and **fits the string in 20 characters** as follows:

- If the string has **less than 20 characters**, append asterisks '*****' to it until it's **exactly 20 characters long**.
- If the string length is **more than 20 characters**, discard all characters after the first 20.

Print the result string at the console.

Examples

Input	Output
Welcome to SoftUni!	Welcome to SoftUni!*
A "regular expression" (abbreviated regex or regexp) is a sequence of characters that forms a search pattern.	A "regular expressio
C#	C#******************

Hints

- If string has a **`length`** < **`20`**, write a **`padRight(20, '*') method`**.

- If string has a **length** > **20**, use **substring(0, 20)**.

15. Censor Email Address

You have some text that contains your email address. You are sick of spammers, so you want to **hide** it. You decide to **censor** your email: to **replace all characters** in it with asterisks (**'*'**) **except the domain**.

Assume your email address will always be in format **[username]@[domain]**. You need to replace the username with asterisks of equal number of letters and keep the domain unchanged.

Input

- The first line holds your **email** address.
- The second line holds a **text** where the email should be censored.

Examples

Input
pesho.peshev@email.bg My name is Pesho Peshev. I am from Sofia, my email is: pesho.peshev@email.bg (not pesho.peshev@email.com). Test: pesho.meshev@email.bg, pesho.peshev@email.bg
Output
My name is Pesho Peshev. I am from Sofia, my email is: ************@email.bg (not pesho.peshev@email.com). Test: pesho.meshev@email.bg, ************@email.bg

Hints

In order to accomplish the task, you may find these steps useful:

- **Split** the email into two parts – **username** and **domain**.
- Create the **replacement** string by duplicating the '*****' character **{username.length}** times and appending **'@'** and the **domain**.
- **Replace** all occurrences of your **email** with the **replacement string**.

16. URL Parser

Write a program that **parses an URL** given in the following format:

```
[protocol]://[server]/[resource]
```

The parsing extracts its parts: **protocol**, **server** and **resource**.

- The **[server]** part is mandatory.
- The **[protocol]** and **[resource]** parts are **optional**.

Examples

Input	Output
http://www.abc.com/video	[protocol] = "http" [server] = "www.abc.com" [resource] = "video"
https://www.softuni.bg/Resources/Materials	[protocol] = "https" [server] = "www.softuni.bg" [resource] = "Resources/Materials"

`ftp://www.su.us/TestResource`	`[protocol] = "ftp"`
	`[server] = "www.su.us"`
	`[resource] = "TestResource"`

`https://softuni.bg`	`[protocol] = "https"`
	`[server] = "softuni.bg"`
	`[resource] = ""`

`www.nakov.com`	`[protocol] = ""`
	`[server] = "www.nakov.com"`
	`[resource] = ""`

Hints

- Find the leftmost occurrence of "**`://`**" in the input URL.
  - If **found**, the left side holds the **protocol**, the right side holds the **server + resource**.
  - If **not found**, the protocol is missing, the input string holds **server + resource** only.
- After the "**protocol**" part is removed from the input URL, find the **leftmost occurrence** of "**/**".
  - If **found**, the left side holds the **server**, the right side holds the **resource**.
  - If **not found**, the resource is missing, the whole string holds the **server**.

17. Change to Uppercase

Write a program that receives a **string** and **modifies the casing of letters to uppercase** at all places **in the text surrounded by `<upcase>` and `</upcase>` tags**. Tags **will not** be nested.

Example

Input
Welcome to the **<upcase>Software University</upcase>**. Learn **<upcase>computer programming</upcase>** and start a **<upcase>job</upcase>** in a software company.
Output
Welcome to the **SOFTWARE UNIVERSITY**. Learn **COMPUTER PROGRAMMING** and start a **JOB** in a software company.

Hints

- You may find the position of the first **`<upcase>`** and the first **`</upcase>`**, delete the text between and insert the uppercase version of the text without the tags at the position of **`<upcase>`**.
- Repeat the above until no more **`<upcase>`** and **`</upcase>`** tags are found in the text.

18. Phonebook

Write a program that receives some info from the console about **people** and their **phone numbers**. Each **entry** should have just **one name** and **one number** (both **strings**).

On each line, you will receive some of the following commands:

- **A {name} {phone}** – adds entry to the phonebook. In case of trying to add a name that is **already** in the phonebook, you should **change** the existing phone number to the **new one**.
- **S {name}** – searches for a contact by given name and prints it in format "**`{name} -> {number}`**". In case the contact isn't found, print "**`Contact {name} does not exist.`**".
- **END** – stop receiving more commands.

Examples

Input	Output

`A Nakov 0888080808`
`S Mariika`
`S Nakov`
`END`
	`Contact Mariika does not exist.`
	`Nakov -> 0888080808`

`A Nakov +359888001122`
`A RoYaL(Ivan) 666`
`A Gero 5559393`
`A Simo 02/987665544`
`S Simo`
`S simo`
`S RoYaL`
`S RoYaL(Ivan)`
`END`
	`Simo -> 02/987665544`
	`Contact simo does not exist.`
	`Contact RoYaL does not exist.`
	`RoYaL(Ivan) -> 666`

`A Misho +359883123`
`A Misho 02/3123`
`S Misho`
`END`
	`Misho -> 02/3123`

Hints

- **Parse the commands** by splitting by space. Execute the commands until "**END**" is reached.
- Store the **phonebook entries** in **`LinkedHashMap<String, String>`** with key **{name}** and value **{phone number}**.

19. Phonebook Upgrade

Add functionality to the phonebook from the previous task to **print all contacts ordered lexicographically** when receive the command "**`ListAll`**".

Examples

Input	Output

`A Nakov +359888001122`
`A RoYaL(Ivan) 666`
`A Gero 5559393`
`A Simo 02/987665544`
`ListAll`
`END`
	`Gero -> 5559393`
	`Nakov -> +359888001122`
	`RoYaL(Ivan) -> 666`
	`Simo -> 02/987665544`

Hints

- **Variant I (slower):** Sort all entries in the dictionary by key and print them.
- **Variant II (faster):** Keep the entries in more appropriate data structure that will keep them in sorted order for better performance.

Part V: Classes and Objects

20. Count Working Days

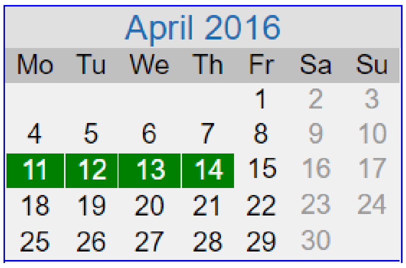
Write a program that **reads two dates** in the format **`dd-MM-yyyy`** and prints the **number of working days** between these two dates **inclusive**. Non-working days are:

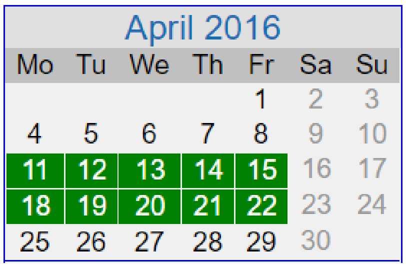
- All days that are **Saturday** or **Sunday**.
- All days that are **official holidays** in Bulgaria:
  - New Year Eve (**1 Jan**)
  - Liberation Day (**3 March**)
  - Worker's day (**1 May**)
  - Saint George's Day (**6 May**)
  - Saints Cyril and Methodius Day (**24 May**)
  - Unification Day (**6 Sept**)
  - Independence Day (**22 Sept**)
  - National Awakening Day (**1 Nov**)
  - Christmas (**24**, **25** and **26 Dec**)

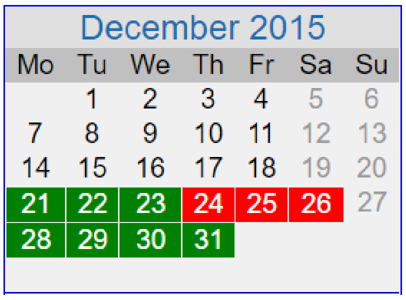
All days not mentioned above are **working** and should count.

Examples

Input	Output	Calendar

`11-04-2016`
`14-04-2016`
	4	April 2016
		Mo Tu We Th Fr Sa Su
		1 2 3
		4 5 6 7 8 9 10
		11 12 13 14 15 16 17
		18 19 20 21 22 23 24
		25 26 27 28 29 30

`11-04-2016`
`22-04-2016`
	10	April 2016
		Mo Tu We Th Fr Sa Su
		1 2 3
		4 5 6 7 8 9 10
		11 12 13 14 15 16 17
		18 19 20 21 22 23 24
		25 26 27 28 29 30

`20-12-2015`
`31-12-2015`
	7	December 2015
		Mo Tu We Th Fr Sa Su
		1 2 3 4 5 6
		7 8 9 10 11 12 13
		14 15 16 17 18 19 20
		21 22 23 24 25 26 27
		28 29 30 31

Hints

- Read **start date** and **end date** from Console.
- **Create** two objects of type **`Date`** – **`startDate`** and **`endDate`**.

- Create an **array of type `Date`** and add **all official holidays** in it.
- Loop from **`startDate`** to **`endDate`**. Add **1 day** at each iteration.
- Get the **current day** in the loop and check whether is **Saturday**, **Sunday** or it is **contained in the holidays array**. If it is not, increment the **`workingDaysCounter`**.

21. Advertisement Message

Write a program that **generates a random fake advertisement message** to extol some product. The messages must consist of 4 parts: laudatory **phrase** + **event** + **author** + **city**. Use the following predefined parts:

- **Phrases** – {"Excellent product.", "Such a great product.", "I always use that product.", "Best product of its category.", "Exceptional product.", "I can't live without this product."}
- **Events** – {"Now I feel good.", "I have succeeded with this product.", "Makes miracles. I am happy of the results!", "I cannot believe but now I feel awesome.", "Try it yourself, I am very satisfied.", "I feel great!"}
- **Author** – {"Diana", "Petya", "Stella", "Elena", "Katya", "Iva", "Annie", "Eva"}
- **Cities** – {"Burgas", "Sofia", "Plovdiv", "Varna", "Ruse"}

The format of the output message is: **`{phrase} {event} {author} – {city}`**.

As input, you take the **number of messages** to be generated. Print each random message at a separate line.

Examples

Input	Output

`3`	`Such a great product. Now I feel good. Elena – Ruse`
	`Excelent product. Makes miracles. I am happy of the results! Katya – Varna`
	`Best product of its category. That makes miracles. Eva - Sofia`

Hints

- Hold the **`phrases`**, **`events`**, **`authors`** and **`towns`** in 4 arrays of strings.
- Create **Random** object and **generate 4 random numbers** each in its range:
  - `phraseIndex` → `[0, phrases.Length]`
  - `eventIndex` → `[0, events.Length]`
  - `authorIndex` → `[0, authors.Length]`
  - `townIndex` → `[0, towns.Length]`
- Get one **random element** from each of the four arrays and **compose a message** in the required format.

22. Intersection of Circles

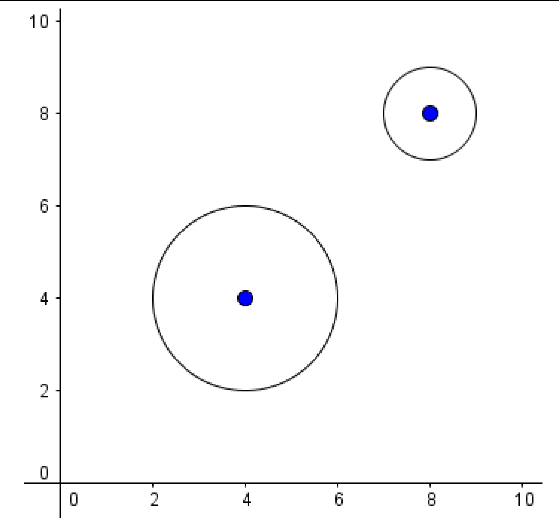
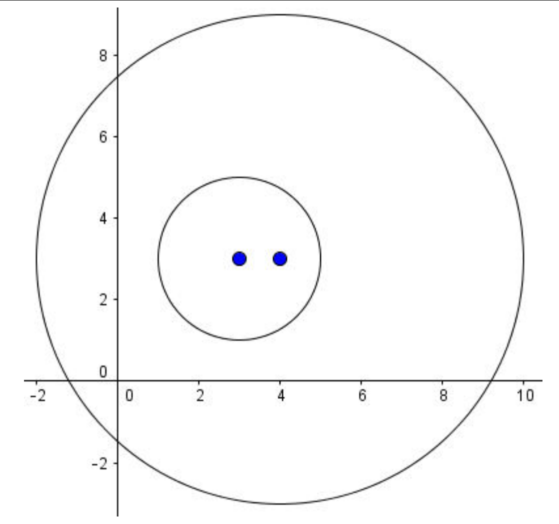
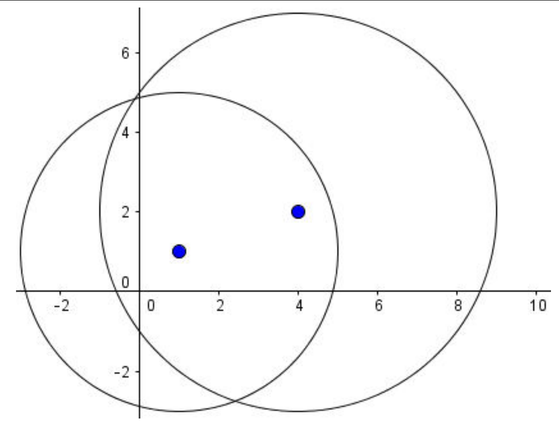
Create a **`Circle`** class with **`Center`** and **`Radius`** properties. The center is a **point** with coordinates **X** and **Y** (make a class **`Point`**). Write a method **bool `Intersect(Circle c1, Circle c2)`** that tells whether the **two** given circles **intersect or not**. Write a program that tells if **two circles** intersect.

Input

The input lines will be in format: **`{X} {Y} {Radius}`**. Print as output "**`Yes`**" or "**No**".

Examples

Input	Output	Visualization

4 4 2 8 8 1	No	
3 3 2 4 3 6	Yes	
1 1 4 4 2 5	Yes	

Hints

- Calculate **d** = **distance between the circle centers**.
- If the **d ≤ r1 + r2** (the sum of radiuses**)** → the circles **intersect** (or one of the circles is inside the other or the circles have one common point when **d = r1 + r2**).
- If the **d > r1 + r2** → the circles do **not intersect** (they have not common shared point).

23. Average Grades

Define a class **`Student`**, which holds the following information about students: **name**, **list of grades** and **average grade** (calculated property, read-only). A single grade will be in range [2…6], e.g. 3.25 or 5.50.

Read a **list of students** and print the students that have **average grade ≥ 5.00** ordered **by name** (ascending), then by **average grade** (descending). Print the student name and the calculated average grade.

Examples

Input	Output

`3`
`Ivan 3`
`Todor 5 5 6`
`Diana 6 5.50`
	`Diana -> 5.75`
	`Todor -> 5.33`

`6`
`Petar 3 5 4 3 2 5 6 2 6`
`Mitko 6 6 5 6 5 6`
`Gosho 6 6 6 6 6 6`
`Ani 6 5 6 5 6 5 6 5`
`Iva 4 5 4 3 4 5 2 2 4`
`Ani 5.50 5.25 6.00`
	`Ani -> 5.58`
	`Ani -> 5.50`
	`Gosho -> 6.00`
	`Mitko -> 5.67`

Hints

- Create class **`Student`** with properties **Name** (**`string`**), **Grades** (**`double[]`**), and property **AverageGrade** (calculated by LINQ as **`Grades.Average()`**, read-only).
- Make a **list of students** and **`filter`** all students that has average **grade >= 5.00** using Java's **stream API**.
- Print the filtered students **ordered by name** in ascending order, then by **average grade** in descending order.

24. Book Library

To model a **book library**, define classes to hold a **book** and a **library**. The library must have a **name** and a **list of books**. The books must contain the **title**, **author**, **publisher**, **release date**, **ISBN-number** and **price.**

Read a **list of books**, add them to the library and print the **total sum of prices by author**, ordered **descending by price** and **then by author's name lexicographically**.

Books in the input will be in format **{title} {author} {publisher} {release date} {ISBN} {price}**.

Examples

Input	Output

`5`
`LOTR Tolkien GeorgeAllen 29.07.1954 0395082999 30.00`
`Hobbit Tolkien GeorgeAll 21.09.1937 0395082888 10.25`
`HP1 JKRowling Bloomsbury 26.06.1997 0395082777 15.50`
`HP7 JKRowling Bloomsbury 21.07.2007 0395082666 20.00`
`AC OBowden PenguinBooks 20.11.2009 0395082555 14.00`
	`Tolkien -> 40.25`
	`JKRowling -> 35.50`
	`OBowden -> 14.00`

Hints

- Create classes **Book** and **`Library`** with all the mentioned above properties:

```
public class BookLibrary {
    public String name;
    public List<Book> books;
}
```

- **Create** an object of type **`Library`**.

- **Read the input** and create a **Book** object for each book in the input.
- Create a **STREAM** query that will **sum the prices by author**, **order the results** as requested.
- **Print** the results.

25. Book Library Modification

Use the classes from the previous problem and make a program that **read a list of books** and **print all titles released after given date** ordered **by date** and then **by title lexicographically**. The date is given if format "**day-month-year**" at the last line in the input.

Examples

Input	Output

`5`
`LOTR Tolkien GeorgeAllen 29.07.1954 0395082999 30.00`
`Hobbit Tolkien GeorgeAll 21.09.1937 0395082888 10.25`
`HP1 JKRowling Bloomsbury 26.06.1997 0395082777 15.50`
`HP7 JKRowling Bloomsbury 21.07.2007 0395082666 20.00`
`AC OBowden PenguinBooks 20.11.2009 0395082555 14.00`
`30.07.1954`
	`HP1 -> 26.06.1997`
	`HP7 -> 21.07.2007`
	`AC -> 20.11.2009`