**Classes and Objects**

Create a simple application in which User can store the details of the hotel and rooms available in it. There are two major domains Hotel and Room.  
  
**Requirement 1:**  
Let’s start off by creating two **Room** objects and check whether they are equal.  
  
1. Create a class **Room** with the following attributes:

|  |  |
| --- | --- |
| **Member Field Name** | **Type** |
| \_number | int |
| \_floor | int |
| \_type | string |
| \_capacity | int |
| \_bookedTime | DateTime |
| \_price | double |

2. Mark all the attributes as private.  
  
3. Create / Generate appropriate properties.  
  
4. Add a default constructor and a parameterized constructor to take in all attributes in the given order:   
**Room(int \_number, int \_floor, string \_type, int \_capacity,DateTime \_bookedTime, double \_price)**  
  
5. When the “room” object is printed, it should display the following details: **[Override the ToString method]**  
**Print format:**  
Number: "\_number"  
Floor: "\_floor"  
Type: "\_type"  
Capacity: "\_capacity"  
Booked Time: "\_bookedTime"  
Price: "\_price"  
  
6. Two rooms are considered same if they have the same floor, number, and type. Implement the logic in the appropriate function. (Case – Insensitive)  
**[Override the Equals method]**  
  
Create **Program** class with **Main** method. Get the room details,it is used to access the above class and its method.  
All the input and output operations are done in this method.  
     The input format consists of room details separated by comma in the below order,  
**\_number,\_floor,\_type,\_capacity,\_bookedTime,\_price**  
  
The Input to your program would be details of two rooms, you need to display their details as given in "5th point(refer above)" and compare the two rooms and display whether they are same or different.  
  
**Problem Overview:**  
The first two line of input consist of a string, that corresponds to the room details(which is comma seperated). Refer above input format.  
Display the two room details in Main method using **ToString** method(Refer above format).  
And also check if the two rooms are same or different(Use Equals method to compare the two objects).  
Equals method return bool value to Main method(true or false).  
If the Equals method returns true, then print "**Room 1 is same as Room 2**".  
If the method returns false, then print "**Room 1 and Room 2 are different**".

**Note:**There is an empty line between display statements. Print the empty lines in the Main method.  
Display one decimal place for double datatype.  
  
**Sample INPUT & OUTPUT 1:**   
Enter room 1 detail:  
**112,1,Villa,5,27-01-2018 15:00:00,15000**  
Enter room 2 detail:  
**112,1,Villa,5,27-01-2018 15:00:00,15000**  
  
Room 1:  
Number: 112  
Floor: 1  
Type: Villa  
Capacity: 5  
Booked Time: 27-01-2018 15:00:00  
Price: 15000.0  
  
Room 2:  
Number: 112  
Floor: 1  
Type: Villa  
Capacity: 5  
Booked Time: 27-01-2018 15:00:00  
Price: 15000.0  
  
Room 1 is same as Room 2  
  
  
**Sample INPUT & OUTPUT 2:**   
Enter room 1 detail:  
**112,1,Villa,5,27-01-2018 15:00:00,15000**  
Enter room 2 detail:  
**201,2,Quad,4,11-05-2018 13:30:00,7000**  
  
Room 1:  
Number: 112  
Floor: 1  
Type: Villa  
Capacity: 5  
Booked Time: 27-01-2018 15:00:00  
Price: 15000.0  
  
Room 2:  
Number: 201  
Floor: 2  
Type: Quad  
Capacity: 4  
Booked Time: 11-05-2018 13:30:00  
Price: 7000.0  
  
Room 1 and Room 2 are different

2. In this requirement, develop a feature to list the rooms that have to be checked out within the specified stipulated time. The check-out time will be one day after the bookedTime.  
  
a)Create a class **Room** with the following attributes: 

|  |  |
| --- | --- |
| **Member Field Name** | **Type** |
| \_number | int |
| \_floor | int |
| \_type | string |
| \_capacity | int |
| \_bookedTime | DateTime |
| \_price | double |

Mark all the attributes as private.  
Create / Generate appropriate properties.  
  
Add a default constructor and a parameterized constructor to take in all attributes in the given order:   
**Room(int \_number,int \_floor, string \_type, int \_capacity, DateTime \_bookedTime, double \_price).**  
Override **ToString** method for print the Room details.  
  
b) Create the following static method in Room class,

|  |  |
| --- | --- |
| **Method Name** | **Description** |
| public List<Room>CheckoutRooms(List<Room>roomList,DateTimecheckoutTime) | This method accepts a list of rooms and checkoutTime as argument. If the given checkoutTime exceeds the bookedTime of the room by a day or more add them to a list and return it. |

Create **Program** class with **Main**method. Get the number of rooms and details for the corresponding number of rooms.  
The input format consists of room details separated by comma in the below order,  
**\_number,\_floor,\_type,\_capacity,\_bookedTime,\_price**  
  
 If the returned list is empty print "**No rooms to checkout"**, else print the rooms as given in below format  
  
**Problem Overview:**  
First get the number of rooms from the user n.  
Then get the n number of lines of input(which is comma seperated), Split that string and create a room object and add that room to the room list.  
The main theme of this problem is filter the room by the below constraints.  
Get the checkout time from the user. Compare the checkout time with the hotel booked time, If the difference between the user entered checkout time and room's booked time is greater then or equal to 1(24 hours), then that will be add to the filtered list and display the filtered room list.  
The above constraint will also consider the time also.  
  
  
When the “room” object is printed, it should display the following format  
Print format:  
**Console.WriteLine("{0,-7} {1,-7} {2,-20} {3,-10} {4,-20} {5,-10}", "Number","Floor","Type","Capacity","Bookedtime","Price");**  
  
**Note:** The above print statements should be present in the Main method.  
Display one decimal place for double datatype.  
  
**Sample Input and Output: 1**   
Enter number of rooms   
**4**   
Enter Rooms details   
**329,3,President Suite,1,27-01-2018 06:30:00,25000  
417,4,Suite,2,27-01-2018 07:00:00,11000  
101,1,Cabana,6,27-01-2018 18:00:00,20000  
517,5,Twin,2,27-01-2018 11:15:00,6000**   
Enter checkout time   
**28-01-2018 23:01:00**   
Rooms to be checkedout

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number | Floor | Type | Capacity | Booked time | Price |
| 329 | 3 | President Suite | 1 | 27-01-18 06:30:00 | 25000.0 |
| 417 | 4 | Suite | 2 | 27-01-18 07:00:00 | 11000.0 |
| 101 | 1 | Cabana | 6 | 27-01-18 18:00:00 | 20000.0 |
| 517 | 5 | Twin | 2 | 27-01-18 11:15:00 | 6000.0 |

3. Power Pairs -- Arrays

Your friend challenges you to play a game, in which you have to find the number of Power pairs in a series of numbers. A Power pair is formed when a number-b is divisible by another number-a that occurs before the number-b in the given sequence. You can easily win the challenge by developing a program to find it.

Input Format

First Line of the input contains a single integer that denotes the size of the array - n.

Second line consists of n space separated integers that denote the array values.

Output Format

The output consists a single integer that denotes the number of Power pairs in the given sequence.

Sample Input 1:

3

1 3 2

Sample Output 1:

2

Explanation :

For sequence = [1, 3, 2]

The sorted pairs are: (1, 3), (1, 2).

So output should be 2.

Sample Input 2:

3

2 4 8

Sample Output 2:

3

4. Nikitha is very interested in programming with arrays, she tries to exhange the positions of the elements by swapping the element and the number at the place which it occupies.

For Example,

Consider the array elements.

1 3 4 2

The element 1 in given array , is at position 1, so 1 is placed at position 1 in output array

The element 3 in given array , is at position 2, so 2 is placed at position 3 in output array

The element 4 in given array , is at position 3, so 3 is placed at position 4 in output array

The element 2 in given array , is at position 4, so 4 is placed at position 2 in output array

The output array becomes 1,4,2,3

Develop a program to help Nikitha.

Input Format:

First Line of the input contains a single integer that denotes the size of the array n

Second  line consists of n space separated integer array values.  The input array values will always be a permutation of numbers from 1 to n.

Output Format:

The output consists of n space separated integers that denote the output array values.

Sample Input 1:

4

1 3 4 2

Sample Output 1:

1 4 2 3

Sample Input 2:

3

1 2 3

Sample Output 2:

1 2 3

5. In this requirement, you need to validate the registrationNumber of the Cab.  
  
a)Create a class **Program**with the Main method and the following static methods:

|  |  |
| --- | --- |
| **Method Name** | **Description** |
| static Boolean ValidateRegistrationNumber(string registrationNumber) | Validate the registrationNumber based on the rules given below. Returns **true**ifregistrationNumber is valid else return **false** |

b) While validating a registrationNumber follow the below rules.  
  
1.The first 2 UPPERCASE letters indicate the state or Union Territory to which the cab is registered.  
2. The second part contains 1-2 digit numbers which are the sequential number of a district.  
3. Third part could contains 0-2 uppercase letters.  
4. The fourth part contains 1-4 digit number which is unique to each number plate.  
5. Each part is separated by space.  
6.Number will be greater than zero.

Valid Format:**TS 01 K 1562**  
  
**Note:** Print "**Registration Number is valid**" if registrationNo is valid else print "**Registration Number is invalid**".  
            All the above print statements are present in the Main method.  
  
**[All text in bold corresponds to input]**  
**Sample Input and Output 1:**  
  
Enter the registration number to be validated:  
**TS 02 AB 9651**  
Registration Number is valid  
  
**Sample Input and Output 2:**  
  
Enter the registration number to be validated:  
**UP 458 H 5462**  
Registration Number is invalid  
  
**Sample Input and Output 3:**  
Enter the registration number to be validated:  
**TS 02 9651**  
Registration Number is valid

6. Write a program to read a string and return a modified string based on the following rules.

Return the String without the first 2 chars except when

1.   keep the first char if it is 'j'

2.   keep the second char if it is 'b'.

Include a class UserMainCode with a static method **getString** which accepts a string. The return type (string) should be the modified string based on the above rules. Consider all letters in the input to be small case.

**Input and Output Format:**

Input consists of a string with maximum size of 100 characters.

Output consists of a string.

Refer sample output for formatting specifications.

**Sample Input 1:**

hello

**Sample Output 1:**

llo

**Sample Input 2:**

java

**Sample Output 2:**

jva

7. Write a program to read a non-negative integer n, compute the sum of its digits. If sum is greater than 9 repeat the process and calculate the sum once again until the final sum comes to single digit.Return the single digit.  
Include a class with a static method **getDigitSum** which accepts the integer value. The return type is integer.  
  
**Input and Output Format:**  
Input consists of a integer.  
Output consists of integer.  
Refer sample output for formatting specifications.  
  
**Sample Input 1:**  
9999  
**Sample Output 1:**  
9  
  
**Sample Input 2:**  
698  
**Sample Output 2:**  
5

8. Given an int array and a number as input, write a program to add all the elements in the array greater than the given number. Finally reverse the digits of the obtained sum and print it.

Include a class with a static method “**addAndReverse**” that accepts 2 arguments and returns an integer.The first argument corresponds to the integer array and the second argument corresponds to the number.

**Example:**

Input Array = {10,15,20,25,30,100}

Number = 15

sum = 20 + 25 + 30 + 100 = 175

output = 571

**Input and Output Format:**

The first line of the input consists of an integer that corresponds to the number of elements in the array.

The next n lines of the input consists of integers that correspond to the elements in the array.

The last line of the input consists of an integer that corresponds to the number.

Output consists of a single integer.

**Sample Input**

6

10

15

20

25

30

100

15

**Sample Output**

571

9. Write a program to read a two strings and one int value(N). check if Nth character of first String from start and Nth character of second String from end are same or not. If both are same return true else return false.  
Check need not be Case sensitive  
Include a class with a static method **isEqual** which accepts the two strings and a integer n. The return type is the TRUE / FALSE.  
  
  
**Input and Output Format:**  
Input consists of two strings and an integer.  
Output consists of TRUE / FALSE .  
Refer sample output for formatting specifications.  
  
**Sample Input 1:**  
AAAA  
abab  
2  
  
**Sample Output 1:**  
TRUE  
  
**Sample Input 2:**  
MNOP  
QRST  
3  
  
**Sample Output 2:**  
FALSE

10. Write a program to read a integer array, Remove the duplicate elements and display sum of even numbers in the output. If input array contain only odd number then return -1.  
Include a class UserMainCode with a static method **sumElements** which accepts the integer array. The return type is integer.  
  
**Input and Output Format:**  
Input consists of an integer n which is the number of elements followed by n integer values.  
Output consists of integer.  
Refer sample output for formatting specifications.  
  
**Sample Input 1:**  
7  
2  
3  
54  
1  
6  
7  
7  
**Sample Output 1:**  
62  
  
**Sample Input 2:**  
6  
3  
7  
9  
13  
17  
21  
**Sample Output 2:**  
-1

11. Given an array, , of size  distinct elements, sort the array in *ascending* order using the *Bubble Sort* algorithm above. Once sorted, print the following  lines:

1. Array is sorted in numSwaps swaps.   
   where  is the number of swaps that took place.
2. First Element: firstElement   
   where  is the *first* element in the sorted array.
3. Last Element: lastElement   
   where  is the *last* element in the sorted array.

**Hint:** To complete this challenge, you will need to add a variable that keeps a running tally of *all* swaps that occur during execution.

**Input Format**

The first line contains an integer, , denoting the number of elements in array .   
The second line contains  space-separated integers describing the respective values of .

**Constraints**

* , where .

**Output Format**

Print the following three lines of output:

1. Array is sorted in numSwaps swaps.   
   where  is the number of swaps that took place.
2. First Element: firstElement   
   where  is the *first* element in the sorted array.
3. Last Element: lastElement   
   where  is the *last* element in the sorted array.

**Sample Input 0**

3

1 2 3

**Sample Output 0**

Array is sorted in 0 swaps.

First Element: 1

Last Element: 3

12. Given a method with two strings as input. Write code to count the common and unique letters in the two strings.

Note:

- Space should not be counted as a letter.

- Consider letters to be case sensitive. ie, "a" is not equal to "A".

The return type of the output is the count of all common and unique characters in the two strings.

**Input and Output Format:**

Input consists of two strings.

Output is an integer.

Refer sample output for formatting specifications.

**Sample Input 1:**

a black cow

battle ship

**Sample Output 1:**

2  
  
**Sample Input 2:**

australia

sri lanka

**Sample Output 2:**

4

13. A manufacturing company have received multiple Boxes of raw materials. Write a program to store the box details into a Set.

**Problem Constraint:**

1. Create a class named Box with attributes length, width and height. All attributes should be of type double. Implement 3 argument constructor, setter / getters and toString() method.
2. Create a Set to store details of multiple Boxes.
3. The Set should have Boxes with unique volume.
4. When adding a Box into the Set, if there is a Box already present with the same volume in the Set, then it should not be added to the Set. Override equals() method in Box to achieve this functionality.

**Sample Input and Output :**  
Enter the number of Box   
**5**  
Enter the Box 1 details   
Enter Length   
**2.1**  
Enter Width   
**1.2**   
Enter Height   
**2.1**  
Enter the Box 2 details   
Enter Length   
**3.2**  
Enter Width   
**2.3**   
Enter Height   
**3.2**  
Enter the Box 3 details   
Enter Length   
**1.2**   
Enter Width   
**2.1**  
Enter Height   
**1.2**  
Enter the Box 4 details   
Enter Length   
**3.2**  
Enter Width   
**2.3**  
Enter Height   
**3.2**   
Enter the Box 5 details   
Enter Length   
**3.3**   
Enter Width   
**2.2**  
Enter Height   
**1.1**   
Unique Boxes in the Set are   
Length =1.2 Width =2.1 Height =1.2 Volume =3.02   
Length =2.1 Width =1.2 Height =2.1 Volume =5.29   
Length =3.3 Width =2.2 Height =1.1 Volume =7.99

Length =3.2 Width =2.3 Height =3.2 Volume =23.55

14. Write a program to display the name of the player who has scored the maximum runs in a cricket tournament.

The player name and number of runs scored by the player are to be stored in a HashMap<String, Long>.

* Key = playerName of type String
* Value = runs of type Long

**Input and Output Format:**

Refer sample input and output for formatting specifications.

All text in bold corresponds to input and the rest corresponds to output.

**Sample Input and Output:**

Enter the number of players

**4**

Enter the details of the player 1

**Mathew**

**572**

Enter the details of the player 2

**Adam**

**495**

Enter the details of the player 3

**Akil**

**465**

Enter the details of the player 4

**Suresh**

**434**

Mathew

15. Write a program to read a string and a positive integer n as input and construct a string with first n and last n characters in the given string.

Include a class  with a static method **formNewWord** which accepts a string and positive integer .

The return type of the output should be a string (value) of first n character and last n character.

**Input and Output Format:**

Input consists of a string of even length.

Output is a string .

Note: The given string length must be >=2n.

Refer sample output for formatting specifications.

**Sample Input 1:**

California

3

**Sample Output 1:**

Calnia

**Sample Input2:**

this

1

**Sample Output 2:**

ts

16. Write a program that construts a hashmap with “state” as key and “capital” as its value. If the next input is a state, then it should return capital$state in lowercase.

Include a class with a static method **getCapital** which accepts a hashmap. The return type is the string as given in the above statement

**Input and Output Format:**

Input consists of 2n+2 values. The first value corresponds to size of the hashmap. The next n pair of numbers contains the state and capital. The last value consists of the “state” input.

Output consists of a string as mentioned in the problem statement.

Refer sample output for formatting specifications.

**Sample Input 1:**

3

Karnataka

Bangaluru

Punjab

Chandigarh

Gujarat

Gandhinagar

Punjab

**Sample Output 1:**

chandigarh$punjab

17. Write a program to read a string containing date in DD/MM/YYYY format and check if its a leap year. If so, return true else return false.  
  
Include a class with a static method **isLeapYear** which accepts the string. The return type is the boolean indicating TRUE / FALSE.  
  
  
**Input and Output Format:**  
  
Input consists of a string.  
  
Output consists of TRUE / FALSE.  
  
Refer sample output for formatting specifications.  
  
**Sample Input 1:**  
  
23/02/2012  
  
**Sample Output 1:**  
  
TRUE  
  
**Sample Input 2:**  
  
12/12/2011  
  
**Sample Output 2:**  
  
FALSE

18. T20 IPL conducts contests for audience during the match. The contest contains 4 players and asked the audience to guess the player of the match(man of the match) . The contest also contained a clue that the first and lastIndex of character ‘a’ in the player name should be same for player of the match.Write a program to guess the player of the match.

[ALL Text in bold are inputs]

Sample Input/Output 1:

Enter the number of players

4

Ravichandran Ashwin

Harbhajan Singh

Rohit Sharma

Michael Hussey

Player of the Match:

Michael Hussey

Sample Input/Output 2:

Enter the number of players

3

Suresh Raina

Maxwell

Harbhajan Singh

Player of the Match:

Maxwell

19. Banking firm needs to calculate the loan EMI start date for its customers who have defaulted EMI payment.   
Write a program to calculate the loan EMI start date, which is 20 months before the given date.    
   
Create a class  with a static method displayDate(), which accepts the given date as String in format yyyy-MM-dd and displays the calculated date in the format yyyy-MM-dd as shown in the sample output.

**Note:**

Use Calendar class to calculate the required date.   
**Input and Output Format:**  
Input consists of a string.    
Refer sample output for formatting specifications.    
   
**Sample Input :**  
2014-04-28    
   
**Sample Output :**

20 months before 2014-04-28 will be 2012-08-28

20. A Company wants to give away bonus to its employees. You have been assigned as the programmer to automate this process. You would like to showcase your skills by creating a quick prototype. The prototype consists of the following steps:

1.   Read Employee details from the User. The details would include id, DOB (date of birth) and salary in the given order. The datatype for id is integer, DOB is string and salary is integer.

2.   You decide to build two hashmaps. The first hashmap contains employee id as key and DOB as value, and the second hashmap contains same employee ids as key and salary as value.

3.   If the age of the employee in the range of 25 to 30 years (inclusive), the employee should get bonus of 20% of his salary and in the range of 31 to 60 years (inclusive) should get 30% of his salary. store the result in TreeMap in which Employee ID as key and revised salary as value. Assume the age is caculated based on the date 01-09-2014. (Typecast the bonus to integer).

4.   Other Rules:

a. If Salary is less than 5000 store -100.

b. If the age is less than 25 or greater than 60 store -200.

c. a takes more priority than b i.e both if a and b are true then store -100.

5.   You decide to write a function **calculateRevisedSalary** which takes the above hashmaps as input and returns the treemap as output.

**Input and Output Format:**

Input consists of employee details. The first number indicates the size of the employees. The next three values indicate the employee id, employee DOB and employee salary. The Employee DOB format is “dd-mm-yyyy”

Output consists of a single string.

Refer sample output for formatting specifications.

**Sample Input 1:**

2

1010

20-12-1987

10000

2020

01-01-1985

14400

**Sample Output 1:**

1010

12000

2020

17280

21. Given a String , write a program to find whether it is a valid password or not.

Validation Rule:

Atleast 8 characters

Atleast 1 number(1,2,3...)

Atleast 1 special character(@,#,%...)

Atleast 1 alphabet(a,B...)

Include a class  with a static method “**validatePassword**” that accepts a String argument and returns a boolean value. The method returns true if the password is acceptable. Else the method returns false.

**Input and Output Format:**

Input consists of a String.

Output consists of a String that is either “Valid” or “Invalid”.

**Sample Input 1:**

abc@1010

**Sample Output 1:**

Valid

**Sample Input 2:**

punitha3

**Sample Output 2:**

Invalid

22. Given a date as a string input in the format dd-mm-yy, write a program to extract the month and to print the month name in upper case.

Include a class  with a static method “**getMonthName**” that accepts a String argument and returns a String that corresponds to the month name.

The month names are {JANUARY, FEBRUARY, MARCH, APRIL, MAY, JUNE, JULY, AUGUST, SEPTEMBER, OCTOBER, NOVEMBER, DECEMBER}

**Input and Output Format:**

Input consists of a String.

Output consists of a String.

**Sample Input:**

01-06-82

**Sample Output:**

JUNE

23. Write a code to read two int array lists of size 5 each as input and to merge the two arrayLists, sort the merged arraylist in ascending order and fetch the elements at 2nd, 6th and 8th index into a new arrayList and return the final ArrayList.

Include a class  with a static method **sortMergedArrayList** which accepts 2 ArrayLists.

The return type is an ArrayList with elements from 2,6 and 8th index position .Array index starts from position 0.

**Input and Output Format:**

Input consists of two array lists of size 5.

Output is an array list .

Note - The first element is at index 0.

Refer sample output for formatting specifications.

**Sample Input 1:**

**3**

**1**

**17**

**11**

**19**

**5**

**2**

**7**

**6**

**20**

**Sample Output 1:**

**3**

**11**

**19**

**Sample Input 2:**

**1**

**2**

**3**

**4**

**5**

**6**

**7**

**8**

**9**

**10**

**Sample Output 2:**

**3**

**7**

**9**

24.