Marquee Company Specific Questions

1. Problem Statement :

Target Practice

Drona normally trains his disciples using a board which consists of concentric circles. When the student correctly hits the center of the concentric circles, his score is 100. The score gets reduced depending on where the students hit on the board. When the student hits outside the board, his score is 0. Drona will not allow a student to have his food unless he scores 100. Arjuna will always hit the target in his first attempt and he will leave early. Others may take more turns to reach a score of 100. Can you write a program to determine the number of turns a disciple takes to reach the target score of 'n'?

Input Format

Input consists of a list of positive integers. The first integer corresponds to the target score 'n'. Assume that all the other integers input are less than or equal to

Output Format

Output consists of a single line. Refer sample output for format details.

Sample 1 Input

```
100
4
40
60
```

Sample 1 Output

```
The number of turns is 3
```

Sample 2 Input

```
50
20
30
40
```

Sample 2 Output

```
The number of turns is 2
```

2. **Water Connection Problem:**

Every house in the colony has at most one pipe going into it and at most one pipe going out of it. Tanks and taps are to be installed in a manner such that every house with one outgoing pipe but no incoming pipe gets a tank installed on its roof and every house with only an incoming pipe and no outgoing pipe gets a tap.

Given two integers n and p denoting the number of houses and the number of pipes. The connections of pipe among the houses contain three input values: a_i, b_i, d_i denoting the pipe of diameter d_i from house a_i to house b_i, find out the efficient solution for the network.
The output will contain the number of pairs of tanks and taps t installed in the first line and the next t lines contain three integers: house number of tank, house number of tap, and the minimum diameter of pipe between them.

Input Format

The first line consists of the value of n.
The second line consists of the value of p.
The next p lines consist of a_i, b_i, d_i denoting the pipe of diameter d_i from house a_i to house b_i.

Output Format

The output will contain the number of pairs of tanks and taps t installed in the first line and the next t lines contain three integers: house number of tank, house number of tap, and the minimum diameter of pipe between them.

Sample 1 Input

```
4
2
1 2 60
3 4 50
```

Sample 1 Output

```
2
1 2 60
3 4 50
```

3. Venkat who is a college student has been provided a task to do a simple program in a very efficient manner.The program given: Provided two arrays A[] and B[] in ascending order with length m and n. The work is to join the two arrays into one list (in ascending order).

Input Format

First line of input contains two space separated integers m and n, denoting the size of the two sorted arrays. Second line of input contains m space separated integers, denoting the first sorted array A. Third line of input contains n space separated integers, denoting the second array B.

Output Format

Display (m + n) space separated integer denoting the merged (joined) array.

Constraints

$1 <= m, n <= 5*10^4$
$0 <= A_i, B_i <= 10^9$

Sample 1 Input

```
4 5
1 3 5 7
0 2 6 8 9
```

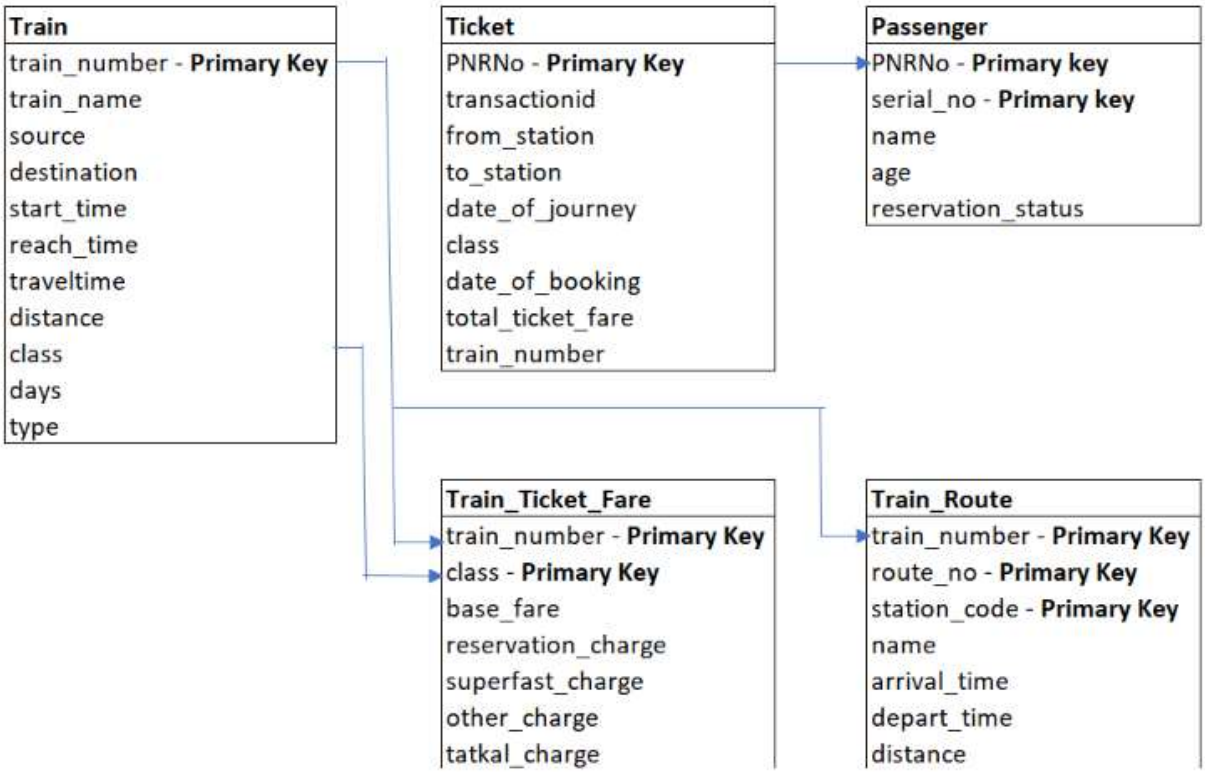
Sample 1 Output

```
0 1 2 3 5 6 7 8 9
```

3. Given the schema of Railway Reservation System, write a query to find the train names that are from Chennai to Mumbai, but do not have the source or destination in its name (train_name).

Sort the output by descending order of train name.

Note:
Refer the table **Train** from the given schema.
Table names are case sensitive.
Refer Output Format section for the output header names.

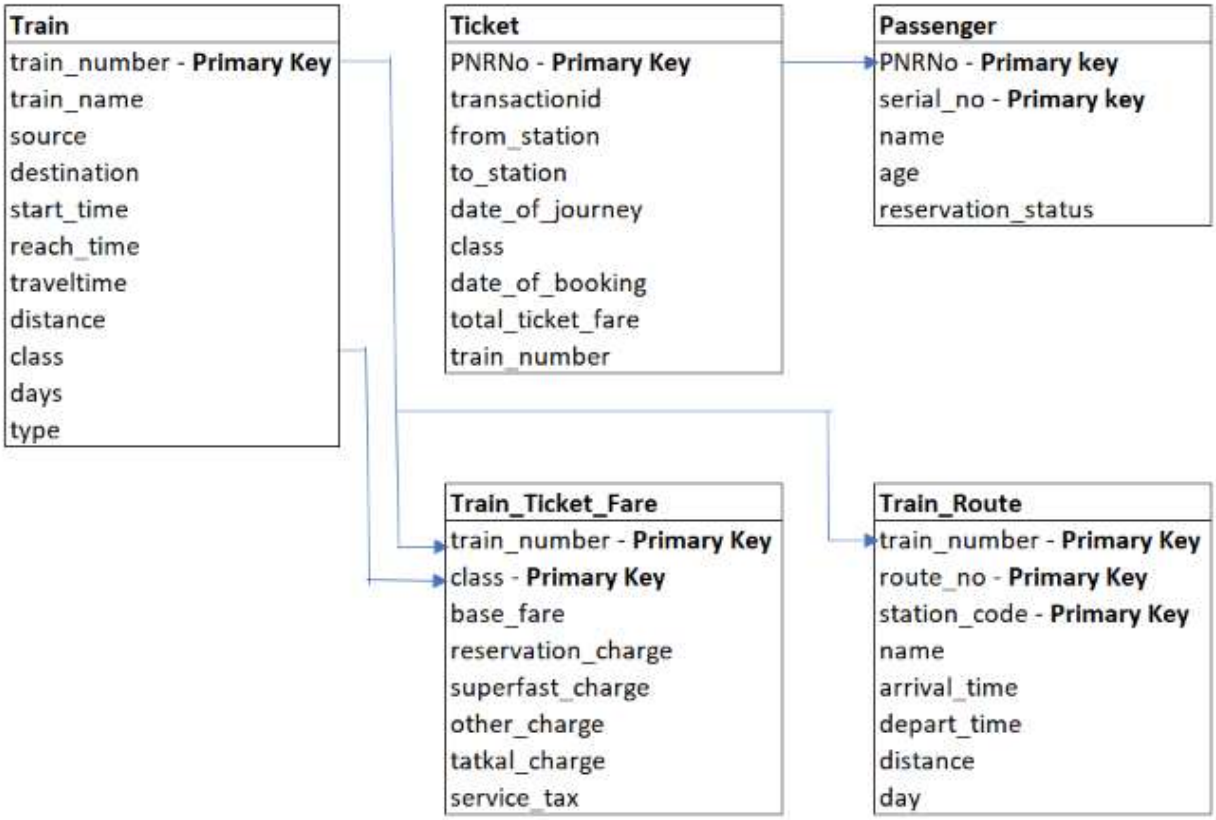


Input Format
The required input tables are populated in the back end.
Output Format
The output should have the below header for the query to be considered.
train_name

4. Given the schema of Railway Reservation System, write a query to find the train details(Refer output format section) that are superfast and the service tax is zero. Ensure no duplicate records.

Sort the output by ascending order of train_name.

Note:
Refer the table **Train** and **Train_Ticket_Fare** from the given schema.
'type' column value will be '**superfast**' for the trains come under super fast category.
Table names are case sensitive.
Refer Output Format section for the output header names.



Input Format
The required input tables are populated in the back end.
Output Format
The output should have the below header for the query to be considered.
train_number, train_name, source, destination, superfast_charge, service_tax

```
train_numbertrain_name  sourcedestination superfast_charge
      service_tax
27678 ABC Express Delhi Kolkatta    25.00 0.00
28900 Chetak Express    Udaipur     Delhi 25.00 0.00
56789 Nilgiri Express   MettupalayamKatpadi     25.00 0.00
21101 Yercaurd Express  Chennai     Erode 125.000.00
```

5. The cities in a country are connected as a graph. The politician has to divide the cities and merge some of them. There are certainly connected cities that when you remove/merge them, the graph becomes disconnected. Those are the vulnerabilities in the connected graph. Given a set of vertices and edges, Identify such points in a graph.

Input Format

The first line of the input consists of the number of vertices.
The second line of the input consists of the number of edges.
The next set of inputs are the edge information.

Output Format

The output prints the point as mentioned in the question.

Sample 1 Input

```
5
5
1 0
0 2
2 1
0 3
3 4
```

Sample 1 Output

```
0 3
```

6. Binary Search Tree - Diameter

Create a binary search tree consisting of only positive values & print the diameter of the tree.

Note

An infinite line of integer input representing the nodes of the binary search tree. If any value less than 1 is encountered, the input loop has to break and print the diameter of the tree.

Example

Input

2 3 1 0

Output

3

Explanation

2 is the root of the tree. 3 and 1 are the right and left children of 2. The diameter of this BST is 3 since the path 3 2 1 or 1 2 3.

Input Format

Read a line of integers.

Output Format

Print the diameter of the tree.

Sample 1 Input :

```
2  3  1  4  0
```

Sample 2 Output :

```
3
```

7. Segment tree - Maximum

Create a segment tree from the user input values & print the maximum in the given range.

Example

Input

5
1 3 4 5 2
1 3

Output

15 8 7 4 4
5

Explanation

In the range(1,3) 5 is the maximum

Input Format

First integer(n) denotes the size of the array
Next line of integers are the array elements
Next line of integers represents the range values

Output Format

First line is the segment tree
Next line has an integer denoting the max value in the given range.

Sample 1 Input :

```
5
1  3  4  5  2
1  3
```

Sample 1 Output

```
15  8  7  4  4
5
```

8. There is a given maze of size N x N [Basically a 2D matrix]. The source and the destination location is top-left cell and bottom right cell respectively. Some cells are valid to move and some cells are blocked. If one rat starts moving from start vertex to destination vertex, we have to find that is there any way to complete the path, if it is possible then mark the correct path for the rat.
The maze is given using a binary matrix, where it is marked with 0, it is a valid path, otherwise 1 for a blocked cell.
NOTE: The rat can only move in four directions, Left to Right, Right to Left, Top to Bottom and Bottom to Top

Input Format

```
This algorithm will take the maze as a matrix.
```

```
In the matrix, the value 0 indicates the free space and 1 indicates the wall
or blocked area.
```

Sample 1 Input

```
5
0  0  0  0  0
1  1  0  1  1
0  0  0  1  1
0  1  1  1  1
0  0  0  0  0
```

Sample 1 Output

```
1  1  1  0  0
0  0  1  0  0
1  1  1  0  0
1  0  0  0  0
1  1  1  1  1
```

9. Alia has studied many new theories in hacking and set up his own squad. She has N individuals (excluding Alia) in her squad, where an individual has a separate skill value S_i where 1<=i<=N. They are standing in a specific order, where the first individual being the leftmost individual and the N^{th} individual being the rightmost individual.
Alia has established a special way to test the contribution of each individual in the team. Contribution by the i^{th} person (C_i) in the team can be calculated as the addition of his skill value and the skill values of his K adjacent squad members on the left side, where the value of K will be decided by Alia.
In case there are not enough members on the left side, the contribution will be equal to the sum of her skill value and the skill values of all the team members on the left side.

Alternatively,

$$C_i = \sum_{j=maximum(i-K,1)}^{i} S_j$$

Alia can perform 2 types of operations now:

1) She can write a program to calculate the total contribution done by all the team members between l to r (both inclusive), where the contribution of each person will be calculated using the value of K decided by her.

2) She can ask any person to change his skill value to X.

Being a great hacker, she is busy with other tasks and needs your help in performing the above operations.

Input Format

The first line contains 2 space-separated integers N and Q, where N denotes the number of individuals in Aila's team and Q denotes the number of operations Alia wants to get completed.

The second line contains N space-separated integers, where i^{th} integer denotes the skill value of the i^{th} individual in the squad.

In the next Q lines, each line contains first integer O, which represents the type of operation.

1) For O=1, line will contain 3 more space-separated integers l,r and K.
Here Alia wants to know the total contribution done by all squad members in the range l to r (both inclusive), where the contribution of each individual will be calculated using the value of K decided by her.

2) For O=2, the line will contain 2 more space-separated integers i and X where Alia asks the i^{th} individual to change her skill value to X.

Output Format

For each operation of the first type, display the required answer in the new line.

Constraints

$1<=N,Q<=10^5$
$1<=S_i,X<=10^8$
$1<=l<=r<=N$
$1<=K<=N$

Sample 1 Input

```
6 3
1 2 3 4 5 6
1 4 5 2
2 4 3
1 4 5 2
```

Sample 1 Output

```
21
19
```

10. Write a program to perform implement a Circular single linked list (It should be a menu-driven program with the following functions: insertleft(),insertright(), insertpos().

Input Format

The input consists of the choices.
If the choice is 1, Enter the element to be inserted(at left).
If the choice is 2, Enter the element to be inserted(at right).
If the choice is 3, Enter the position and the element to be inserted.
If the choice is 4, Display the list.
If the choice is 5, exit.
If the choice is greater than 5, print "Wrong choice".

Output Format

The output prints the results based on the choice.
Refer sample input and output for formatting specifications.

Sample 1 Input

```
1
15
4
1
30
4
1
45
4
1
60
4
2
75
4
2
90
4
2
105
4
2
120
4
3
4
100
4
5
```

Sample 1 Output

```
15
30 15
45 30 15
60 45 30 15
60 45 30 15 75
```

60 45 30 15 75 90
60 45 30 15 75 90 105
60 45 30 15 75 90 105 120
60 45 30 100 15 75 90 105 120