Qualification Round Africa and Arabia 2011

Submissions

Closing the Loop

10pt	Not attempted **285/375 users** correct (76%)
23pt	Not attempted **267/285 users** correct (94%)

Investing at the Market

10pt	Not attempted **234/303 users** correct (77%)
23pt	Not attempted **223/234 users** correct (95%)

Building a House

10pt	Not attempted **164/189 users** correct (87%)
23pt	Not attempted **148/165 users** correct (90%)

Top Scores

oa12gb	99
ahmed.aly	99
naguib	99
marcog1	99
amrSamir	99
mohammad.kotb	99
abdo88	99
AhmedSalem	99
OzzyH	99
Abdurrahman	99

Problem A. Closing the Loop

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the Quick-Start Guide to get started.

Small input 10 points	Solve A-small
Large input 23 points	Solve A-large

Problem

Given a bag full of rope segments, you will build the longest loop of rope while alternating colors. The bag contains **S** segments and each segment will either be blue (**B**) or red (**R**). You are required to alternate between colors and because of this requirement you might not use every segment in the bag. If you only have segments of a single color, you will not be able to tie any knots and should output `0`. Each segment length is provided in centimeters and each knot in the loop consumes one centimeter of length from the loop. In other words, a knot consumes one-half of a centimeter from of the two segment it connects.

Note that pieces of string that have length 1, if used in making the cycle, might get reduced to just a pair of knots of total length 0. This is allowed, and each such piece counts as having been used.

Input

The first line of input gives the number of cases, **N**.
N test cases follow. For each test case there will be:

- One line containing the value **S**, the number of rope segments in the bag.
- One line containing a space separated list of **S** values. Each value **L** indicates the segment length in centimeters followed by the letter **B** or **R** to indicate the segment color.

Output

For each test case, output one line containing "Case #**x**: " followed by the maximum length of the rope loop that can be generated with the rope segments provided.

Limits

1 ≤ number of rope segments (**S**) ≤ 1000
1 ≤ length of a rope segment (**L**) ≤ 100

Small dataset

N ≤ 5

Large dataset

N ≤ 50

Sample

```
Input                    Output
4                        Case #1: 0
1                        Case #2: 13
5B                       Case #3: 8
4                        Case #4: 38
6R 1B 7R 3B
7
5B 4R 3R 2R 5R 4R 3R
2
20B 20R
```


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Problem B. Investing at the Market

Small input 10 points	Solve B-small
Large input 23 points	Solve B-large

Problem

You have money **M** to invest and a forecast of a commodity price **P** for each month in the coming year. Of course you want profit! Figure out when to buy and sell in order to maximize your profit. You cannot buy a fraction of an item. You can assume that the price will be different each month. If two scenarios exist that result in the same profit, you should choose to buy at the lowest price per unit. You can only make a single purchase. If it is impossible to make a profit given the market trends, you should output `IMPOSSIBLE`.

Input

The first line of input gives the number of cases, **N**.
N test cases follow. For each test case there will be:

- One line containing the amount of money **M** that you have to invest.
- One line containing a space separated list of 12 integers **P** indicating the price at the beginning of each month.

Output

For each test case, output one line containing "Case #**x**: " followed by either the word "IMPOSSIBLE" or three space separated integers:

- The index **B** of the month when you should buy the goods. An integer between 1 and 11 (inclusive).
- The index of the month when you should sell the goods. An integer between (**B** + 1) and 12 (inclusive).
- The amount of profit that your investment plan will return.

Limits

100 ≤ **M** ≤ 500
1 ≤ **P** ≤ 250

Small dataset

N ≤ 10

Large dataset

N ≤ 200

Sample

```
Input
3
100
1 2 3 4 5 6 7 8 9 10 11 12
100
52 50 25 100 61 63 70 51 71 55 10 5
100
200 150 250 132 125 110 210 220 180 176 108 113


Output
Case #1: 1 12 1100
Case #2: 3 4 300
Case #3: IMPOSSIBLE
```

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Qualification Round Africa and Arabia 2011

A. Closing the Loop
B. Investing at the Market
C. Building a House

Contest Analysis
Questions asked

Problem C. Building a House

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the Quick-Start Guide to get started.

Small input 10 points	Solve C-small
Large input 23 points	Solve C-large

Problem

You have just bought land and want to plant the largest rectangular field possible. In surveying your land, you find a number of obstacles and decide to draw a map. You indicate in each square of the map whether it contains grass (**G**), rock (**R**), water (**W**), shrubs (**S**), or trees (**T**). While the grass can be mowed and the shrubs dug from the ground, the water, rocks, and trees **cannot** be removed. Given these obstacles, determine the area of the largest rectangular field.

Input

The first line of input gives the number of cases, **N**.
N test cases follow. For each test case there will be:

- One line containing two space-separated integers indicating the length (**L**) and width (**W**) of your land.
- Followed by, **W** lines, each containing **L** characters where each indicates the conditions for that square of land (one of `G, R, W, S, or T`).

Output

For each test case, output one line containing "Case #**x**: " followed by the maximum area of the largest rectangle that can be cleared.

Limits

1 ≤ **L** ≤ 50
1 ≤ **W** ≤ 50

Small dataset

N ≤ 10
Fewer than 5 obstacles in each test case.

Large dataset

N ≤ 30
Fewer than 20 obstacles in each test case.

Sample

```
Input     Output
4         Case #1: 1
1 1       Case #2: 4
G         Case #3: 2
2 2       Case #4: 9
GS
SG
2 2
GT
GG
5 8
GGTGG
TGGGG
GSSGT
GGGGT
GWGGG
RGTRT
RTGWT
WTWGR
```

Questions asked 1

Submissions

Vanishing Numbers

10pt	Not attempted **27/126 users** correct (21%)
17pt	Not attempted **3/27 users** correct (11%)

Battlefield

12pt	Not attempted **20/61 users** correct (33%)
21pt	Not attempted **17/19 users** correct (89%)

Radio Receiver

15pt	Not attempted **9/23 users** correct (39%)
25pt	Not attempted **6/9 users** correct (67%)

Top Scores

RalfKistner	83
amrSamir	83
Nooodles	83
mohamedafattah	83
fegla	60
seanwentzel	58
TheKro	50
emadwill	48
Keegan	43
mRefaat88	43

Problem A. Vanishing Numbers

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the Quick-Start Guide to get started.

Small input 10 points	Solve A-small
Large input 17 points	Solve A-large

Problem

There is a pool of numbers which are arbitrary decimal fractions from the interval (0, 1). In the first round of the game the middle third of the interval disappears, and the numbers from this interval are eliminated from the pool. In the next rounds the middle thirds of each of the remaining intervals disappear. In the first round the the interval [1/3, 2/3] is eliminated and in the second round the two intervals [1/9, 2/9] and [7/9, 8/9] are eliminated, and so on. The endpoints of each removed interval are removed as well.

Your role is to sort the pool of numbers in the order that they are eliminated. If some numbers are never eliminated, list them last. In case of a tie, list the smaller numbers first.

Input

The first line of input will contain **T**, the number of test cases. **T** test cases will follow. Each one will start with a line containing an integer **N**. **N** numbers will follow, one per line. Each number will start with "0.", followed by one or more decimal digits. Each number will be larger than zero and will not have any trailing zeros.

Output

For each test case, print the line "Case #**x**:", where **x** is the number of the test case, starting with 1. After that line, list the numbers, one per line, in order of elimination.

Limits

T ≤ 100
N ≤ 100

Small dataset

Each number will have at most 5 digits after the decimal point.

Large dataset

Each number will have at most 11 digits after the decimal point.

Sample

Input	Output
3	Case #1:
2	0.5
0.12	0.12
0.5	Case #2:
2	0.1
0.9	0.9
0.1	Case #3:
3	0.00449602349
0.00449602349	0.10613259697
0.10613259697	0.3283702389
0.3283702389	

In case #1, 0.5 is eliminated in the first round because it falls into the interval [1/3, 2/3]. After the first round, there are two intervals remaining: (0, 1/3) and (2/3, 1). The number 0.12 is eliminated in round 2 because it falls into the interval [1/9, 2/9].

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Questions asked 1

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TheKro	50
emadwill	48
Keegan	43
mRefaat88	43

Problem B. Battlefield

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the Quick-Start Guide to get started.

Small input 12 points	Solve B-small
Large input 21 points	Solve B-large

Problem

You are playing a game where the battlefield consists of **N** cities and **R** bidirectional roads. Your goal is to start at some city **C** of your choice and visit all **R** roads exactly once ending this trip at **C**. If this is not possible you must add the minimum number of additional roads to the initial set of roads to make this trip feasible. Please note that there might be more than one road connecting the same pair of cities and that you are allowed to add roads between any pair of cities regardless of whether they already had roads connecting them or not as shown in the sample input/output.

Input

The first line of input gives the number of test cases, **T**. **T** test cases follow. For each test case there will be:

- One line containing the value **N**, the number of cities.
- One line containing the value **R**, the number of roads.
- **R** lines corresponding to the roads. Each contains 2 values **A** and **B** separated by one space. **A** and **B** are 2 distinct integers ($0 \leq$ **A**,**B** $<$ **N**) indicating the end points of that road.

Output

For each test case, output one line containing "Case #**x**: ", where **x** is the number of the test case, followed by the minimum number of roads needed.

Limits

$1 \leq$ **T** ≤ 30
$2 \leq$ **N** ≤ 1000

Small dataset

$1 \leq$ **R** ≤ 15

Large dataset

$1 \leq$ **R** $\leq 10^4$

Sample

Input	Output
3 2 2 0 1 0 1 3 3 1 2 1 2 2 1 4 5 0 1 2 0 0 3 1 2 3 1	Case #1: 0 Case #2: 1 Case #3: 1

Online Competition Africa and Arabia 2011

A. Vanishing Numbers

B. Battlefield

C. Radio Receiver

Questions asked 1

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Problem C. Radio Receiver

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the Quick-Start Guide to get started.

Small input
15 points

Solve C-small

Large input
25 points

Solve C-large

Problem

You have a radio receiver and want to receive **N** messages. Each message is transmitted at a predetermined time measured in seconds since the epoch. Also each message is transmitted from a predetermined position representing the displacement in meters from the origin (you are in 1-dimensional space). Your radio is capable of receiving any message that is transmitted no farther than **D** meters from your current position, where **D** is a nonnegative real number.

You can start at any position of your choice and move at the rate of at most one meter per second. The action of receiving a message itself takes no time. Your task is to find the smallest **D** that allows you to get all messages.

Input

The first line of input gives the number of test cases, **C**. **C** test cases follow. For each test case there will be:

- One line containing the integer **N**, the number of messages.
- **N** lines corresponding to the **N** messages where each of them contains 2 integers **P** and **T** separated by one space. **P** is the position where the message is transmitted from and **T** is the time when this message is transmitted (The messages will have distinct transmission times).

Output

For each test case, output one line containing "Case #**x**: ", where **x** is the number of the test case, followed by the minimum value **D** that allows you to get all messages. Answers with a relative or absolute error of at most 10^{-9} will be considered correct.

Limits

$1 \le \mathbf{C} \le 100$
$1 \le \mathbf{N} \le 1000$

Small dataset

$0 \le \mathbf{P} \le 1000$
$0 \le \mathbf{T} \le 1000$

Large dataset

$0 \le \mathbf{P} \le 10^9$
$0 \le \mathbf{T} \le 10^9$

Sample

Input	Output
3 3 7 2 20 3 0 11 2 6 5 6 3 4 5 3 2 1 9 4 7 2	Case #1: 6 Case #2: 0 Case #3: 2.00

Here is one possible scenario with **D** = 6 for test case #1. Start at position 13 and time 2 to get message 0. Then walk to the right to position 14, arriving at time 3 to get message 1. Then walk left to position 6, arriving at time 11 to get

message 2.
