



Problem A

Lumberjack Sequencing

Input: lumber.in

Another tale of lumberjacks?. Let see ...

The lumberjacks are rude, bearded workers, while foremen tend to be bossy and simple-minded. The foremen like to harass the lumberjacks by making them line up in groups of ten, ordered by the length of their beards. The lumberjacks, being of different physical heights, vary their arrangements to confuse the foremen. Therefore, the foremen must actually measure the beards in centimeters to see if everyone is lined up in order.

Your task is to write a program to assist the foremen in determining whether or not the lumberjacks are lined up properly, either from shortest to longest beard or from longest to shortest.

Input

The input starts with line containing a single integer N, $0 < N < 20$, which is the number of groups to process. Following this are N lines, each containing ten distinct positive integers less than 100.

Output

There is a title line, then one line per set of beard lengths. See the sample output for capitalization and punctuation.

Sample Input	Output for the Sample Input
3	Lumberjacks:
13 25 39 40 55 62 68 77 88 95	Ordered
88 62 77 20 40 10 99 56 45 36	Unordered
91 78 61 59 54 49 43 33 26 18	Ordered



Problem B

The heart flu

Input: heartflu.in

It has been discovered that a new disease is attacking human beings. This new disease consists in a virus that attacks the heart, causing malfunction of it, leading to a permanent brain damage –in the best case scenario- or death. Since a collective paranoia has been raised, all hospitals have exceeded their capacity to check every patient that comes into the ER.

One of the new guidelines proposed by the hospital director was to create a triage, based on a computer program because there are no doctors enough to review all ECGs.

The proposal is to admit a patient into the ER, take him/her to the ECG room where the patient lecture will be taken. The computer will take some specific points of the ECG and determine if the patient should be reviewed carefully by a doctor or if the patient is healthy and a psychiatrist needs to talk to him and explain the effects of the paranoia in his/her feelings.

You have been assigned to create the program that will take the lecture points in the ECG.

The important complex in an ECG is called QRS complex.

- Q is the first wave in the complex with negative value
- R is the second wave in the complex with positive value, and in a classic ECG, is the biggest wave
- S is the last wave in the complex with negative value that comes after R wave.

In a normal ECG, the QRS complex has duration between 60 and 100 milliseconds, and a voltage no greater than 35 mV, and has no valleys.

Input

The input consists in the name of the patient, followed by an *, age an * and the points of lecture in the ECG separated by commas. Each point of data is 10 ms apart from each other. The point is given in mV.

Output

Each patient data will be separated by a --- line.

The name of the patient

Age

Triage [PASS | NO PASS]



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Sample Input

Gambino, Christine*35*0,0.1,-0.35,1.3,-0.55,0,.05,0

Martim, Gustavo*29*0,0.1,-0.5,1.5,-1,0,0.075,0

Guzman, Isabel*15*0,0,-0.05,-0.1,0.1,0.25,0.5,0.7,0.4,0.2,-0.01,-0.25,-0.5,-0.25

Output for the Sample Input

Gambino, Christine

35

Triage PASS

Martim, Gustavo

29

Triage PASS

Guzman, Isabel

15

Triage NO PASS



Problem C

\$ 10 to Win?

Input: ToWin.in

Howdy Michael is a young and inexperienced gambler. Howdy bets much money in several Sport Games (basketball, baseball, hockey and football). This type of bet (combination of several Sport Games) is well-known like Parlay (gambling).

Parlay (gambling) Rules

A parlay wager is a combination of individual independent wagers that only pays if no individual wager loses. The payout from each wager is applied or “parlayed” to the next wager in turn. If any individual wager loses, the bettor receives nothing. If any individual wager is a tie or “push”, that wager is effectively ignored, reducing the ultimate payout.

How to calculate payment of a Parlay (gambling)?

The sports book quotes the payout rate for an individual wager as a “money line”, a non-zero integer in the range -2000 to 2000. To compute the payout for a successful wager, the money line is converted to a decimal multiplier as follows: if the money line is positive, it is divided by 100 to obtain the multiplier. If the money line is negative, 100 is divided into the absolute value to obtain the multiplier. The multiplier is always rounded to three digits after the decimal point. The wager is multiplied by this multiplier to determine the amount won. The amount won is always rounded to next value integer if the amounts won contains cents (no cents).

Consider the following example for a five-way parlay wager:

Money Line	Wager	Multiplier	Amount Won
-170	\$ 10	100/170	\$ 6
-160	\$ 16	100/160	\$ 10
125	\$ 26	125/100	\$ 33
-135	\$ 59	100/135	\$ 44
-140	\$ 103	100/140	\$ 74
Subtotal:			\$ 167
Original Wager:			\$ 10
Total Returned:			\$ 177.00

The maximum payout for any parlay wager is \$1 million. If the calculated total exceeds that amount, the actual total returned will be \$1 million.

Write a program that helps us to Howdy Michael will calculate the total amount returned for a series of parlay wagers. For each parlay wager, your program is to print the total amount returned in dollars and cents on a single line starting in the first column without embedded or trailing whitespace. Print the leading dollar sign and insert commas at the millions and thousands positions as needed.



Input

Input will consist of several wagers. The first line of input to your program will contain the total number of parlay wagers as a single positive integer.

Each wager that follows will be represented by a series of lines.

The first line of each parlay wager contains the initial bet and the count of individual wagers as integers separated from each other by a single space.

The following lines represent the individual wagers, one per line. Each individual wager is given as its money line.

Output

For each parlay wager, you should generate one line of output with the following values: The dataset number as a decimal integer (start counting at one), a space, and the total amount returned in dollars followed by “.00” cents. Print the leading dollar sign and insert commas at the millions and thousands positions as needed.

Sample Input	Output for the Sample Input
3	1 \$177.00
10 5	2 \$1,884.00
-170	3 \$255.00
-160	
125	
-135	
-140	
10 8	
-170	
-160	
125	
-135	
-140	
110	
120	
130	
15 5	
100	
-100	
-250	
135	
-350	



Problem D

Financial Management

Input: Financial.in

Michael graduated of ITESO this year and finally has a job. He's making a lot of money, but somehow never seems to have enough. Michael has decided that he needs to grab hold of his financial portfolio and solve his financing problems. The first step is to figure out what's been going on with his money.

Michael has his bank account statements and wants to see how much money he has. Help Michael by writing a program to take his closing balance from each of the past twelve months and calculate his average account balance.

Input

The first line of input contains a single integer N , ($1 \leq N \leq 100$) which is the number of datasets that follow.

Each dataset consists of twelve lines. Each line will contain the closing balance of his bank account for a particular month. Each number will be positive and displayed to the penny. No dollar sign will be included.

Output

For each dataset, you should generate one line of output with the following values: The dataset number as a decimal integer (start counting at one), a space, a character '\$', and a single number, the average (mean) of the closing balances for the twelve months. It will be rounded to the nearest penny.

Note: Used comma (,) to separate the thousands.

Sample Input	Sample Output
1 100.00 489.12 12454.12 1234.10 823.05 109.20 5.27 1542.25 839.18 83.99 1295.01 1.75	1 \$1,581.42



Problem E

Code Number

Input: **CODE.in**

Adrian and Maria are relatives that live in different towns. As they inhabit a rural area, it is very difficult for them to keep in touch. One way they found to overcome their communication problem was to send a line through their parents that used to visit each other.

The point is that Adrian and Maria did not want that their parents read their messages, and they decided to create a secret code for the messages. The code is not very sophisticated, but you should keep in mind Adrian and Maria are just children.

In general, the meaning of a message is based on changing some letters by numbers. Each message is composed by several lines using uppercase letters of the English alphabet, space and punctuation symbols: dot and comma. The letters that are changed by numbers can be seen in the following example; this change is the same for all messages between Adrian and Maria.

Message in “**Code Number**”:

H3LL0 MY L0V3, 1 M H499Y 83C4U53 500N 1 WILL 83 70 Y0UR 51D3.
7H15 71M3 W17H0U7 Y0U H45 833N 373RN4L. 1 1NV173 Y0U 70 7H3 200
0N3 70 533 7H3 238R42 4ND 60R1L42.

Decode Message:

HELLO MY LOVE, I M HAPPY **BECAUSE SOON I WILL BE TO YOUR SIDE.**
THIS TIME WITHOUT YOU HAS BEEN ETERNAL. I INVITE YOU TO THE
ZOO ONE TO SEE THE ZEBRAS AND GORILAS.

Hint: In this example, the relation Number-Letter between the message in “Code Number” and the Decode Message this indicated by the numbers and letters in bold.

Input

The first line of input gives the number of test cases, T ($1 \leq T \leq 30$). Each test case represents a message written in **Code Number**, which is composed by $1 \leq N \leq 100$ lines and each line cannot exceed 80 characters of length. Two words in the same line are separated by one white space. One blank line separated each test case.

Output

For each test case you must print the decoded message. You must print a blank line between each test case.



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Sample Input

1

H3LL0 MY L0V3, 1 M H499Y 83C4U53 500N 1 WILL 83 70 YOUR 51D3. 7H15
71M3 W17H0U7 YOU H45 833N 373RN4L. 1 1NV173 YOU 70 7H3 200 0N3 70
533 7H3 238R45 4ND 60R1L45.

Output for the Sample Input

HELLO MY LOVE, I M HAPPY BECAUSE SOON I WILL BE TO YOUR SIDE. THIS
TIME WITHOUT YOU HAS BEEN ETERNAL. I INVITE YOU TO THE ZOO ONE TO
SEE THE ZEBRAS AND GORILAS.



Problem F

Cancer or Scorpio

Input: Cancer.in

Alice and Michael is a young couple who are planning on having their first child. Their wish their son Nelson was born on a special date for both of them.

Alice has investigated in the internet and has found that the period of gestation is forty weeks. These forty weeks begin to count on the first day of the last menstrual cycle.

Michael is passionate about astrology and even more about the zodiac signs, he has asked Alice to investigate the range of dates that correspond to each sign.

Sign	Begin	End
Aquarius	January, 21	February, 19
Pisces	February, 20	March, 20
Aries	March, 21	April, 20
Taurus	April, 21	May, 21
Gemini	May, 22	June, 21
Cancer	June, 22	July, 22
Leo	July, 23	August, 21
Virgo	August, 22	September, 23
Libra	September, 24	October, 23
Scorpio	October, 24	November, 22
Sagittarius	November, 23	December, 22
Capricorn	December, 23	January, 20

Alice and Michael ask for help to calculate the date of birth of their son Nelson and his zodiac sign.

Input

The first line of input contains a single integer N , ($1 \leq N \leq 1000$) which is the number of datasets that follow.

Each dataset consists of a single line of input that contains only eight digits that represent the date of the first day of the last menstrual cycle in format MMDDYYYY.

Output

For each dataset, you should generate one line of output with the following values: The dataset number as a decimal integer (start counting at one), a space, the date of birth in format MM/DD/YYYY, a space, and the name (in lowercase) of zodiac sign that correspond according to the date of birth.



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Note: Considers leap years.

Sample Input	Sample Output
2 01232009 01232008	1 10/30/2009 scorpio 2 10/29/2008 scorpio



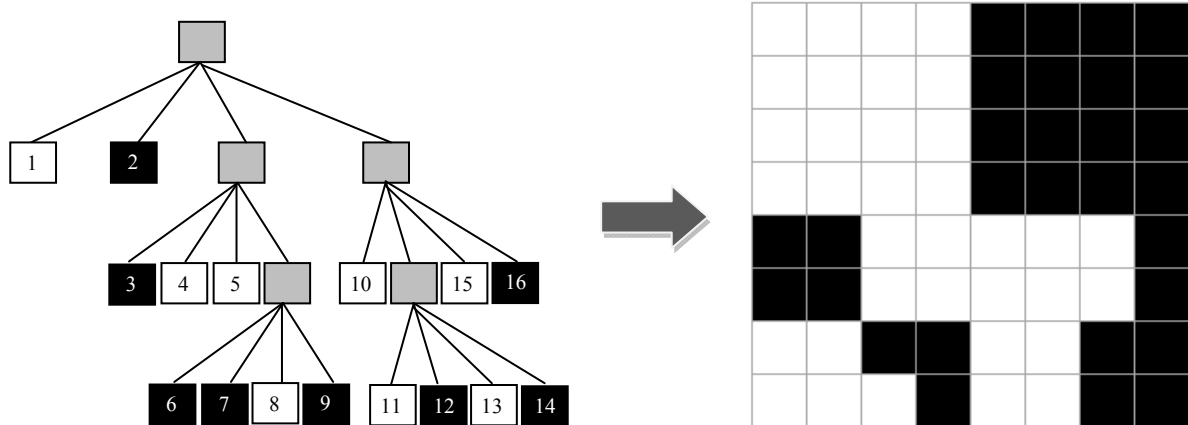
Problem G

Reading a Quadtree

Input: rqt.in

A *quadtree*, first introduced by Finkel and Bentley, is a tree data-structure in which each internal node has exactly four children. Quadtrees are often used for problems that can be mapped into a two-dimensional space which is then recursively subdivided into four equally-sized regions while a certain condition holds. The problem consists in reading a compressed binary image represented with a quadtree and determining which pixels are set to white.

For a better understanding of this problem, consider the third test case from Sample Input, represented in the figure. The uncompressed binary image is composed by (8 x 8) pixels, where 35 of them are white. Notice each node in the quadtree is mapped into a square area from the target image. White nodes denote areas composed by white pixels exclusively, whereas black nodes denote areas with only black pixels; finally, gray nodes are composed by white and black pixels and thus, they need to be subdivided into four new square areas. Notice that the order of visiting square areas is: left to right and top to bottom.



Input

The first line contains an integer $N > 0$ denoting the number of test cases. The next N lines start each with the length L of the target image; L has to be a power of 2. The length is followed by a space and a sequence of 0, 1 and *, denoting black, white and gray nodes of the quadtree, respectively. The quadtree is traversed in pre-order.

Output

The output consists of N lines containing each a comma-separated list of either:
a) (x,y) position of a pixel adjacent horizontally by black pixels, or
b) (x_i-x_f,y) , where $x_f > x_i$: a sequence of white pixels at row y surrounded by black pixels.



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The following holds: $1 \leq x, x_i, x_f, y \leq L$. Traverse the binary image from left to right, top to bottom.

If L is not a power of 2, the output should display the text “Invalid length”, instead.

Sample Input

```
3
4 **1000*010010
7 *101*0100
8 *10*011*0010*1*101010
```

Output for the Sample Input

```
(1,1),(4,1),(1-2,3),(1-2,4)
Invalid length
(1-4,1),(1-4,2),(1-4,3),(1-4,4),(3-7,5),(3-7,6),(1-2,7),(5-6,7),(1-3,8),(5-6,8)
```



Problem H

Calculating IRR

Input: irr.in

Johnny Money is a big-time investor well-known for having the ability to identify good business opportunities. To measure the profitability of a business or project, Johnny calculates the internal rate of return (IRR) based on a projected or existing cash-flow of such a business. If the IRR is greater than any interest rate offered by the bank, the investment is convenient.

In more specific terms, the IRR of an investment is the interest rate (%) at which the sum of the present value of all projected costs (negative cash flows) and benefits (positive cash flows) of the investment equals the initial investment. The present value is calculated dividing the value by an interest rate as many times as the period indicates. For example, the present value of a cost of \$100.00 projected for the 3rd period (or month) with an interest rate of 10% is \$75.13.

The problem consists of calculating the IRR given an initial investment and the cash flow. For a better understanding of the problem, consider the following example. The initial investment is \$4,000.00 and five periods are projected. The first one results in a benefit of \$3,852.56; the second period projects a cost of \$2,954.21; the three following periods projects benefits of \$1,500.00, \$2,120.86 and \$2,890.64, respectively. Was it a profitable investment? To answer that, we need to find an interest rate such that the sum of the present values equals the initial investment. From the table above, it is clear that such an interest rate is 22.294%, from which we conclude that Johnny Money will accept to invest in this business.

	Actual	10%	20%	30%	22.294%
1	\$ 3,852.56	\$ 3,502.33	\$ 3,210.47	\$ 2,963.51	\$ 3,150.24
2	-\$ 2,954.21	-\$ 2,441.50	-\$ 2,051.53	-\$ 1,748.05	-\$ 1,975.29
3	\$ 1,500.00	\$ 1,126.97	\$ 868.06	\$ 682.75	\$ 820.12
4	\$ 2,120.86	\$ 1,448.58	\$ 1,022.79	\$ 742.57	\$ 948.18
5	\$ 2,890.64	\$ 1,794.86	\$ 1,161.68	\$ 778.53	\$ 1,056.74
Sum	\$ 7,409.85	\$ 5,431.24	\$ 4,211.46	\$ 3,419.31	\$ 3,999.99
Sum - Inv	\$ 3,409.85	\$ 1,431.24	\$ 211.46	\$ -580.69	\$ 0.01

The reader is suggested to treat this problem as a root-finding problem, which can be solved by means of numerical methods, particularly, the *bisection* method. This method repeatedly cuts the current interval in half, defining two new subintervals; then it selects the one in which the root must lie: the functions of the first and last values of the subinterval have different signs. Assume that every IRR ranges from -100% to 100%. As an initial interval, the positive half if the sum of the projected values (in the table, \$7,409.95) is greater than the investment; choose the negative half, otherwise.



Input

The first line contains an integer number, $N > 0$, denoting the number of test cases. The next N lines contain each a cash flow defined as a space-separated list of two-decimal numbers denoting costs (if negative) or benefits (if positive).

Output

The output consists of N lines, where each line $k \leq N$ contains a three-decimal number in the range $(-100.0.. 100.0)$ followed by the character %, denoting the estimated IRR for cash flow k .

Sample Input

```
3
500.00 75.60 174.40 -60.75 319.25 84.63 31.17
100.00 42.27 35.00 -22.35 10.00
4000.00 3852.56 -2954.21 1500.00 2120.86 2890.64
```

Output for the Sample Input

```
6.873%
-26.369%
22.294%
```

Hint: If there are more than 3 decimals in the output, it has to be rounded using the round-up algorithm.



Problem I

Neverland

Input: neverland.in

Neverland is compounded by many communities of lost kids. These communities can have one or more kids and/or a nested community (only 1) and that nested community can have one or more kids and/or a nested community (only 1), etc.

Peter Pan decided to celebrate a national championship of “Rock-paper-scissors”. Due the nation is really big he implemented a Web application to set the information. (Only to get the information) from all the kids.

The form requests the following information:

- Name of the kid
- Main weapon (Rock, paper or scissors)
- Secondary weapon (Rock, paper or scissors)*

The Web application will export all the information in a String with the following syntax:

`[(Name-Main Weapon-Secondary Weapon)(Name-Main Weapon-Secondary Weapon)]`

Example

`[[[(Michael-P-S)(John-P-R)][(Peter-P-R)(Campanita-S-P)]](Wendy-S-S)(Guillermo-R-R)]`

Where

`()` = A kid

`[]` = Community with two or more kids and also can contain a nested community (Only one is valid)

`S` = Scissors

`P` = Paper

`R` = Rock



Example Explanation

1. Neverland is integrated by 2 kids, and a sub-community at the same level:
 - a. [(Michael-P-S)(John-P-R)][(Peter-P-R)(Campanita-S-P)]
 - b. (Wendy-S-S)
 - c. (Guillermo-R-R)
2. The sub-community is compounded also by 2 kids and a sub-community at the same level:
 - a. (Michael-P-S)
 - b. (John-P-R)
 - c. [(Peter-P-R)(Campanita-S-P)]
3. The third sub-sub-community is compounded also by 2 kids at the same level:
 - a. (Peter-P-R)
 - b. (Campanita-S-P)

Requirement

Develop a program that get the String generated by the Web Application and process the games (see rules) to provide a general Champion of Neverland.

Game Rules

1. Only kids can play (sub-communities are not valid)
2. Only two kids can play at the same time.
3. If a community have a nested community, the games of the nested community must start first
4. The winner of a nested community must play with the first kid left to right.
5. A kid can use the same weapon for main and secondary choices
6. The kids will always use the same main weapon for all their games. (Exceptions will be described in rule 7).



7. If both players (P1, P2) have the same weapon, to avoid a draw they need to use secondary weapons in the following order:
- P1W1 – P2W1
 - P1W2 – P2W1
 - P1W1 – P2W2
 - P1W2 – P2W2

*If all options were used and there is not a winner, P1 will be the winner

Input

```
[[[(Michael-P-S)(John-P-R)[(Peter-P-R)(Campanita-S-P)]](Wendy-S-S)(Guillermo-R-R)]
```

One case per line.

Output

```
Peter, Weapon: P VS Campanita, Weapon: S  
Won: Campanita  
Campanita, Weapon: S VS Michael, Weapon: P  
Won: Campanita  
Campanita, Weapon: S VS John, Weapon: P  
Won: Campanita  
Campanita, Weapon: P VS Wendy, Weapon: S  
Won: Wendy  
Wendy, Weapon: S VS Guillermo, Weapon: R  
Won: Guillermo  
Final Winner: (Guillermo-R-R)
```

Each case is separated by a blank line.