What is the air speed velocity…

…of a fully laden swallow? This fearful question was posed to the intrepid band of Grail searchers. Their response of "African or European?" was partly correct. The air speed would most definitely depend on the sub-species of swallow. King Arthur, fearing more intense questioning in this vein, ordered his royal mathematicians to determine the air speed of a fully laden swallow – both African and European.

The mathematicians called upon the royal birders to capture a number of swallows of both types, lade them fully, and then release them from point A and time their arrival at point B. Since they didn't want to confuse their figures, the European and African swallows were each started from a different location, so that each group flew a different distance, but all swallows in the same group flew the same distance. They then asked the royal map-makers to determine the distance (measured in furlongs) between the two starting points and the finish point. Using 10 swallows of each type, the royal mathematicians would then compute the average air speed for each group.

However, the royal mathematicians were somewhat lazy. After gathering all the data, they decided it was MUCH too hard to do all those nasty calculations by hand. So, they quickly constructed a time machine and have come into the future to enlist your help: they need you to write a program to do the calculations, which they will then take back into the past with them. Thus the searchers of the Grail will be saved from certain doom, (should this dastardly question be posed again), and you will go down in history as a hero. (Well, maybe not history, since they are from the past, so maybe you'll go down in futurory?)

There's one tricky bit (you knew it was coming): the royal mathematicians cannot agree on exactly how the average should be calculated. Some believe that, for each group, one should add up all of the times and then divide the total distance covered by all the swallows of that type by the total time (this is method 1). Others are of the opinion that the average speed is determined by computing the speed for each swallow, summing those values and then dividing that total by the total number of swallows (this is method 2). Your program should compute the average both ways, to avoid a nasty falling out among the royal mathematicians.

The input provided by the royal mathematicians is somewhat disorganized – the two breeds' times have been intermixed and they weren't too careful about capitalization. But each entry is on a separate line and marked with an 'A' or 'a' or 'E' or 'e' to aid in identification. Each line begins with this single letter, followed by a single space. The final datum on the line is the elapsed time the swallow flew, expressed in hours. Since the time-keeping of the era wasn't very accurate, this value is simply a real number (> 0) with a single level of precision, such as 1.5 (one and a half hours), or 0.4 (four-tenths of an hour).

Input

The very first line of the input file will consist of 2 integers, both greater than 0, separated by a single space. The first integer is the distance the African swallows flew and the second integer is the distance the European swallows flew. Next come the times for the swallows (20 lines total: 10 for African, 10 for European – NOT in this order). Thus the input file has a total of 21 lines.

Output

The format for the output should be grouped by methods, with Method 1 being displayed first. Each method will produce 3 lines of output:

- **Line 1:** the name of the method (capitalized, with a digit identifying it), e.g. “Method 1” (the quotes are not part of your output.)
- **Line 2:** the speed of a fully-laden African swallow (expressed in furlongs per hour), e.g. “African: 3.00 furlongs per hour” (the quotes are not part of your output.)
- **Line 3:** the speed of a fully-laden European swallow (expressed in furlongs per hour) e.g. “European: 3.00 furlongs per hour” (the quotes are not part of your output.)

The format for the data for each method is as follows:

- The full name of the breed of swallow (capitalized), beginning with African
- A colon
- A single space
- The speed (to two digits of accuracy, with leading 0 for values < 1.0)
- A single space
- The phrase “furlongs per hour” (the quotes are not part of the output).

See the Sample output section below for any clarifications you require.

Sample Input

```
6 5
a 1.0
A 1.0
E 2.0
E 2.0
A 1.0
e 2.0
a 1.0
A 1.0
E 2.0
E 2.0
A 1.0
e 2.0
a 1.0
A 1.0
E 2.0
E 2.0
A 1.0
e 2.0
e 1.0
a 2.0
```

Sample Output

```
Method 1
African: 5.45 furlongs per hour
European: 2.63 furlongs per hour
Method 2
African: 5.70 furlongs per hour
European: 2.75 furlongs per hour
```

Problem B Input File: b.in Output: to monitor

The Brave Sir Robin's cAsE cOrReCtOr

Dissatisfied with the loud and constant pronouncements of his alleged misdeeds by a trio of indefatigable minstrels, the brave knight Sir Robin wishes to exercise his authority by modifying their lyrics. The minstrels were happy to provide printed transcripts of their songs, and cheerfully announced that they would not change a word of them.

Undaunted, the brave (and crafty) Sir Robin scrutinized the documents and noticed that their loudest inflections were indicated by capital letters and realized that he could at least lower their voices. This, he reasoned, could be accomplished by replacing upper case letters with lower case letters ("Case correction", from his perspective). These modifications could be forced upon the singers by insistence upon proper usage of the King's English. Not all letters can be lower case, however, as the King's English mandates some letters must be upper case.

Strangely hesitant about performing "case correction" personally, the brave, crafty (and managerially capable) Sir Robin humbly requests you write a program to perform a first pass of case correction for the songs. There will still be some corrections required after this program is used.

As your program reads the file, it must force to upper case all alphabetic characters that follow terminal punctuation marks (period, question mark, and exclamation point) with only white space or parentheses characters following. All other alphabetic characters are to be forced to lower case. Note that decimal numbers are not to be followed by an upper case character unless the number itself is followed by a terminal punctuation mark.

Input

The input file contains the text that you are converting. Your conversions should be based on the rules given by Brave Sir Robin above.

Output

The output is to be the converted text. All characters are transferred to the output. Some will have cAsE cOrReCtiOn, others will be directly copied.

Sample input

```
The Brave Sir Robin took a short walk in a dark forest where rabbits did stalk.  a
ray of sunlight made him jump from his own shadow with A FACE AS PALE AS CHALK.
```

Sample output

```
the brave sir robin took a short walk in a dark forest where rabbits did stalk.  A
ray of sunlight made him jump from his own shadow with a face as pale as chalk.
```

Problem C Input File: NONE! Output: to monitor

Sir Bedavere's Bogus Division Solutions

The wise Sir Bedavere often uses non-standard logic, yet achieves positive results[1]. Well, it seems he has been at it again, this time with division. He has determined that canceling the common digit of a numerator and denominator produces the correct answer. Of course, Sir Bedavere only tried this on a small sample of three digit numbers. An example of what he did is shown in the following division problem (in which he canceled the common 6):

$$\frac{166}{664} = \frac{16\cancel{6}}{\cancel{6}64} = \frac{16}{64}$$

Your task is to find all three digit number combinations with the following property:

number combinations where removing the rightmost digit from the top number (numerator) and the identical leftmost digit from the bottom number (denominator) leaves the result of the calculation unchanged.

Omit all of the trivial cases — xxx/xxx = xx/xx (222/222 = 22/22). The solutions are to be shown in increasing order of the top number (the numerator).

The Input

NONE! There is no input for this problem.

The Output

Show the bogus division problems one to a line in the format shown below (which gives a *sample* merely to show the format) — single spaces separate the non-blank characters.

```
217 / 775 = 21 / 75
249 / 996 = 24 / 96
```

[1] Please see the scene "How do you know she's a witch?" or recall the quote "…how sheep's bladders may be employed to prevent earthquakes."

Problem D Input File: d.in Output: to monitor

One…Two…Five!

The set of integers has rarely been a domain of error in everyday conversation. The king, however, is "three blind" and cannot visualize any number containing the digit '3' in its base 10 representation. He does intuitively sense the number between 2 and 4 and compensates for his blindness in the following manner: whenever he wants to state any number containing the digit '3', he will speak a series of numbers until they can all be combined (in the order given) via addition, subtraction, multiplication and division to produce the desired value which contains the digit '3'. Mathematical operators work from left to right without any other regard for order of precedence (i.e. 6 + 7 * 11 = 143 → a number with a '3').

For example, if the king says "1 2 5", then a knight will say "3" using the following logic:

```
1 2 5 = 1 * 2 - 5 = 2 - 5 = |2 - 5| = 3
```

Note that there are no negative numbers in optimistic Camelot. Every subtraction will produce a nonnegative result by what is called, in these enlightened times, the absolute value. All division is integer division, i.e. 7/5 = 1. Obviously, if the number zero appears as a divisor, then division will not be attempted.

The court, however, has a problem. Some of the computations produce more than 1 number containing the digit '3'! You have been appointed to write a program which computes and displays the most frequently appearing number containing the digit '3'. In the event of a tie, use the largest number.

Input

The input will consist of an unspecified number of lines. Each line will contain at least 1 and at most 9 integers. Every number will be nonnegative and less than 100. A line with a single '#' character will be the end of input.

Output

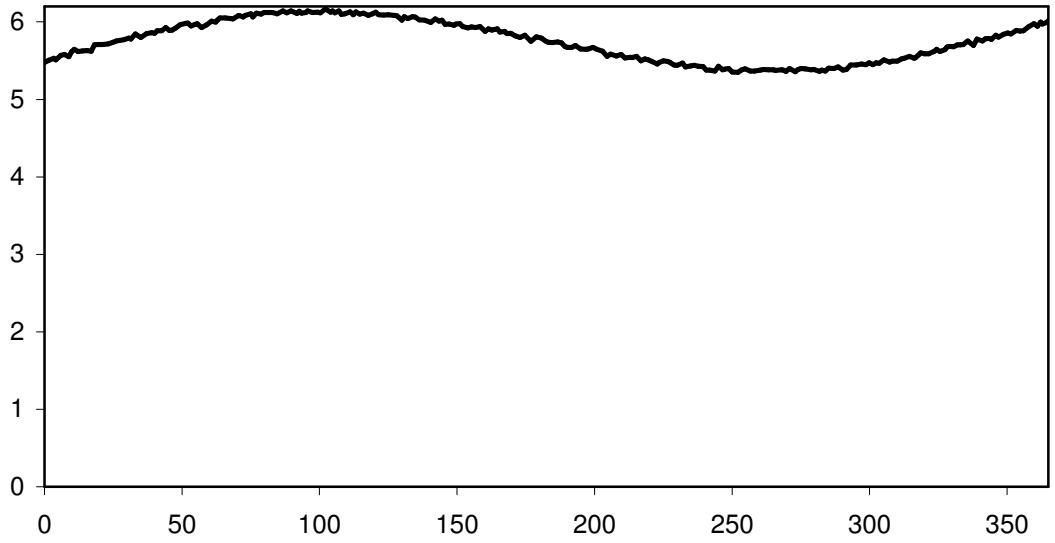
For every line of input, print a line showing the number most probably meant by the king as described above. If there is no such number, print "No result".

Sample Input	Sample Output
1 2 5 1 1 6 5 1 #	3 No result 30

Taunt Exposure Estimation

The brave knights *(**kə' nig' əts***) of Camelot are constantly exposed to French taunting while assaulting the castle occupied by the French. Consequently, the taunting to which they are exposed varies with their distance from the castle during their assault, as well as variations in French taunting activity. We need to estimate the total amount of taunting that they are exposed to during a certain time period. Unfortunately, we only have access to a set of measurements at random times — we do not have a continuous reading — and, because of flaws in our archaic equipment, the measurements of taunting occur at unpredictable intervals.

The total amount of taunting will be given by the integral of the taunting intensity during the time period, as held in the observation data file. The amount of random noise, though, is fairly high, so that a simple trapezoid-rule integration is all that is merited.



The Input

- A single number, ***n***, specifying the number of data points in the file
- ***n*** pairs of floating point numbers (given in increasing x order), separated by a comma — in other words, a CSV file that *could* be input for a spreadsheet program [the first number is the x coordinate (time specification), the second is the y coordinate (the radiation reading)][1]

The Output

A single line of text giving the first and last x values (with two digits to the right of the decimal point), and the computed integral (with four digits to the right of the decimal point), in the fashion shown below (which reflects the data shown in the graph):

```
0.00 to 365.25: 2099.8021
```

[A reasonable value for the given input, (shown in the graph above), since the values range around 5 ¾, and 365.25 * 5.75 gives 2100.1875.]

[1] Sample input and output on the following page (according to Ralph The Wonder Llama)

Sample Input[2]

```
9
 0.0000, 0.5176
 0.9869,  1.000
  1.596,  1.114
  2.370,  1.006
  2.904, 0.8481
  3.506, 0.5760
  3.996, 0.4775
  5.004, 0.3945
  6.283,  1.004
```

Sample Output[3]

```
0.00 to 6.28: 4.7288
```

[2] A Møøse once bit my sister...

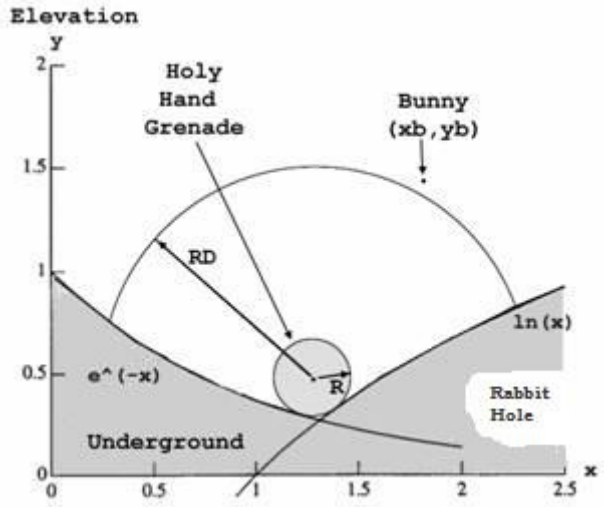
[3] We apologise for the fault in the footnotes. Those responsible have been sacked.

Problem F Input file: f.in Output: to monitor

Ye Holy Hand Grenades!

Holy Hand Grenades have found multiple uses throughout history. Most notably, King Arthur did use a Holy Hand Grenade (HHG) to dispatch a vicious rabbit which was guarding the entrance to a cave. The instructions for its use are in the Book of Armaments (Chapter 2, verses 9-21), and are read as follows:

"First shalt thou take out the Holy Pin. Then, shalt thou count to three. No more, no less. Three shall be the number thou shalt count, and the number of the counting shall be three. Four shalt thou not count, neither count thou two, excepting that thou then proceed to three. Five is right out. Once the number three, being the third number, be reached, then lobbest thou thy Holy Hand Grenade of Antioch towards thy foe, who, being naughty in My sight, shall snuff it." Amen.



Unfortunately, the Book of Armaments faileth to mention that the HHG must come to a complete stop (i.e. rest stably) before it can explodeth and blow a rabbit to tiny bits. As long as it rolleth or wobbeleth, it refuseth to explodeth. Unknown is the reason why the authors of the Book of Armaments neglected to mention this pertinent fact. Further complicating matters, different HHGs have different radii of destruction (*RD*). Once a HHG resteth stably, and explodeth, everything within or equal to its *RD* shalt be snuffed out. Presumably, this is what happened to the rabbit with big, pointy teeth; however, there remaineth some controversy over this matter. Because of this controversy, the king hath decreed a simulation to be run that may possibly answer this question.

- Your task is to determine the result of the grenade's explosion.
- The grenade must always be at rest in order to detonate. All HHGs have a radius R=1 and a variable radius of destruction (RD). At the instant of detonation, the rabbit could be mid-leap, on the ground, or underground.
- For each simulation the terrain remaineth unchanged. It consisteth of two intersecting curves, $y = e^{-x}$ and $y = ln(x)$ as we have revealed unto you in the illustrious illustration. The curves reside in the plane formed by the rabbit, the grenade, and the center of the earth. The terrain is impervious to detonations, and changeth not between tests.
- If a bunny's center of mass is strictly below the ground level (as denoted by the intersecting curves) when a HHG explodeth, that bunny shalt remaineth un-snuffedeth and thus shalt live to bite another day.
- If the bunny resideth strictly outside of the range of a stably resting HHG's radius of destruction, that bunny shalt also remain un-snuffedeth out.
- Each result shalt be dependent upon computations accurate even unto 8 significant figures.
- There shalt not be an input value smaller even than 1.0E-15 or greater even than 1.0E+15.
- Because the bunny's center of mass doth be its location, a bunny might possibly end up inside both the *RD* and the R=1 of a HHG. This simply means the bunny is curled around the grenade. If the center of mass of such a bunny be strictly inside the *RD* it shall most surely be snufféd out. Amen.

Input

The **first line** of input doth contain yea verily a **single integer** indicating the **number of holy hand grenades** in the data file. Each **line of the file** doth contain the radius of destruction of this particular holy hand grenade, and finally doth contain the rabbit's x coordinate (xb) and y coordinate (yb) during this particular test run.

Output

For each test run, thy program shalt print out the words "**Bunny Bits**" (if the rabbit is blown to bits by the grenade) or "**Bunny Biteth Knights**" (if the rabbit liveth to fight on another day anon).

Sample Input	Sample Output
2 1.5 3.0 3.0 5.5 3.0 3.0	Bunny Biteth Knights Bunny Bits

Problem G Input file: g.in Output: to monitor

Nested Shrubbery Boxes

After each commission to install a shrubbery, Roger the Shrubber has to transport many empty planting boxes with a drawn cart. In this instance, a planting box is a wooden box with one open side.

Given a set of ***n*** planting boxes, compute the largest number of boxes that can be nested. Specifically, report the number of the largest subset of boxes which may be nested such that the smallest box of the subset fits within the second smallest, the second smallest of the subset fits within the third smallest, the third smallest of the subset fits within the fourth smallest, and so forth.

A box **i** (b_i) fits into box **j** (b_j) if there exists some rotation of b_i such that each dimension of b_i is less than the corresponding dimension of b_j. Any box can be rotated to nest inside another box.

Input

The input will consist of an unspecified number of box sets. Each set will begin with a line containing ***n***, $0 \le n \le 500$, the number of boxes in the set. Each box will be described on its own line by three positive integers representing length, width and height (Each value will not exceed 1000). The first two numbers of each box description will be followed by a space, the letter '**x**', and a space. The end of input occurs when ***n*** = -1.

Output

For each set of boxes, print a line containing the largest number of boxes that can be selected from the original set to form a fully nesting subset of boxes.

Sample Input	Sample Output
5 145 x 472 x 812 827 x 133 x 549 381 x 371 x 900 271 x 389 x 128 718 x 217 x 491 4 432 x 123 x 139 942 x 844 x 783 481 x 487 x 577 677 x 581 x 701 -1	2 4