Objective:

- Learn to calculate the Time/Space equation.
- To get your hands dirty: It's good for you ☺.

Task-1

Think of any function that you coded in your previous programming courses and try to calculate the Time/Space equation of them:

For example:

- Addition of two matrices
- Multiplication of two matrices
- Calculating the power
- Calculating the factorial
- Union of two sets
- Intersection of two sets
- Is Relation symmetric?
- Finding the binary representation of a given number
- And many more ….

Task-2

Determine, for the typical algorithms that you use to perform calculations by hand, the running time to do the following:

A. Add two N-digit integers.
B. Multiply two N-digit integers.
C. Decimal to Binary Conversion.

Also specify the problem size in adding, multiplying, and decimal to binary conversion.

Task-3

An anagram is a word or phrase formed by rearranging the letters of another word or phrase. For example, carthorse is an anagram of orchestra. Blanks within a phrase are ignored in forming anagrams. Thus, orchestra and horse cart are also anagrams. Write a program that read a list of phrases and prints all pairs of anagrams occurring in the list.

Input

Input description... The Input file will contain a single integer at the first line of the input, indicate the number of test case you need to test followed by a blank line. Each test case will consist of from 1 to 100 lines. A completely empty or blank line signals the end of a test case. Each line constitutes one phrase.

Output

Output description... Some number of lines (including possibly 0 if there are no anagrams in the list), each line containing two anagrammatic phrases separated by = . Each anagram pair should be printed exactly once, and the order of the two phrases within a printed pair must be lexicographic, as well as the first phrases and the second ones in case some first are equal. Two consecutive outputs for two consecutive inputs is separated by a single blank line.

Example

Input:

1

carthorse
horse
horse cart
i do not know u
ok i now donut
orchestra

Output:

carthorse = horse cart
carthorse = orchestra
horse cart = orchestra
i do not know you = ok i now donut

Hint:

Start Early

If you get stuck somewhere in solving the questions: you can discuss with me or T.A in this regard.

Advice:

I know you will do mistakes, don't worry you are allowed to make mistakes but should not repeat them. Try to calculate time/space equation of as much functions as possible.