

(1)

$(0,0)$
 $(-2,-2) \times (-2,0)$

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~~Problem-1 Which Truck Is Closer?~~

General Statement: The Jones Trucking Company tracks the location of each of its trucks on a grid similar to an (x, y) plane. The home office is at location $(0, 0)$. Read the coordinates of truck A and the coordinates of truck B and determine which is closer to the office.

Input: The first line of the data set for this problem is an integer representing the number of collections of data that follow. Each collection contains 4 integers: the x -coordinate and then the y -coordinate of truck A followed by the x -coordinate and then the y -coordinate of truck B.

Output: All letters are upper case.

The output is to be formatted exactly like that for the sample output given below.

Assumptions: The x -coordinate is in the range $-20 .. 20$. The y -coordinate is in the range $-20 .. 20$.

Discussion: The distance between point #1 with coordinates (x_1, y_1) and point #2 with coordinates (x_2, y_2) is:

Sample Input:

4
3 -2 4 5 -3
0 6 1 2
-7 8 4 -1
3 3 -2 2

$$\begin{aligned} & (-5-3)^2 + (-3+1)^2 \\ & = 64 + 16 = 80 \\ & \sqrt{80} = 4\sqrt{5} \approx 8.94 \\ & (10-0)^2 + (0-6)^2 \\ & = 100 + 36 = 136 \\ & \sqrt{136} = 2\sqrt{34} \approx 11.66 \end{aligned}$$

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Sample Output:

A IS CLOSER
B IS CLOSER
B IS CLOSER
B IS CLOSER

Problem-2 Time Passes

General Statement: Read 2 times (based on a 24-hour clock) and determine how much time has elapsed from time #1 to time #2.

Input: The first line of the data set for this problem is an integer that represents the number of data sets that follow. Each data set is on a separate line and consists of 2 times in the form hh:mm:ss. Values less than 10 have a leading zero.

Output: Output the number of hours, the number of minutes, and the number of seconds that have passed from the first to the second time.

Label each time unit

All letters are upper case.

The output is to be formatted exactly like that for the sample output given below.

Assumptions: This is a 24-hour clock.

Hours are in the range 0..23. Minutes and seconds are in the range 0..59.

Discussion:

If time #2 is "before" time #1, it is the following day.

Sample Input:

3
10:03:43 15:00:58
07:25:00 20:52:14
16:30:30 05:40:10

Sample Output:

4 HOURS 57 MINUTES 15 SECONDS
13 HOURS 27 MINUTES 14 SECONDS
13 HOURS 9 MINUTES 40 SECOND

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Problem-3 Spiral Unwind

General Statement: Given a collection of letters that fill a square matrix, unwind in the given direction. The collection lists the rows of the matrix in order.

Input: The first line of the data set for this problem is an integer that represents the number of strings that follow. Each string is on a separate line. The first letter of the string is the unwinding direction (R = right, L=left).

Output: Output the list of unwound letters on a single line.

All letters are upper case.

The output is to be formatted exactly like that for the sample output given below.

Assumptions: All letters are upper case.

The maximum number of letters is 25.

There may be duplicate letters within the matrix.

Discussion: A square matrix has the same number of rows and columns. Choose the matrix size based on the number of letters in the data set. Fill the matrix row by row working from left to right. Begin unwinding the matrix at the top-left corner.

Sample Input:

3

RABCDEFHIJKLMNOP
LABCDEFHIJKLMNOP
RQRABATSCA

Sample Output:

ABCDHLPONMIEFGKJ
AEIMNOPLHDCBFJKG
QRATACSBA

Problem-4 Scientific Notation

General Statement: Read a number in scientific notation and output its equivalent decimal value.

Input: All data is on a single line. The first integer indicates how many pairs of numbers follow. The first of each pair is A, the base number, and the second is E, the power of 10.

Output: Round each answer to 2 decimal places. Trailing zeros to the right of the decimal point are required. A leading zero to the left of the decimal point is not required.

The output is to be formatted exactly like that for the sample output given below.

Assumptions: E is in the range $-10 \dots 10$. A is 1 or larger but less than 10.

Discussion: If $A = 3.926$ and $E = 4$, the number represented is 3.926×10^4 or 39260, which is 39260.00 when rounded to 2 decimal places.

Sample Input: 4 4.296 3 3.8 -2 1.8 2 2.8678 1

Sample Output:

4296.00

0.04

180.00

28.68

Problem-5 Do You Have Enough Money?

(S)

General Statement:

Read the amount of money you have and the prices of the items you intend to buy. Determine whether you have enough money to buy everything you selected or whether you are short of money. If you do not have enough money, indicate the amount of the shortfall. Be sure to include 8% tax when figuring the amount you need.

Input:

The first line in the data set is an integer that represents the number of data collections that follow. There are an unknown number of money amounts in each data set. The value -1 is used to indicate the end of the collection of prices.

Output:

All letters are to be upper case. Include the amount of shortfall if you do not have enough money. This money amount is to have a dollar sign (\$) in front of the amount and it is to be rounded to 2 decimal places. The output is to be formatted exactly like that for the sample output given below.

Assumptions:

The -1 used to indicate the end of a data collection is not part of the data for the problem.

Sample Input:

3

10.50 7.60 1.26 3.49 -1

15.75 6.00 3.98 -1

21.00 5.25 5.75 4.76 3.98 1.50 -1

Sample Output:

\$2.84 SHORT

ENOUGH MONEY

\$1.94 SHORT

Problem-6 Print Commands

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General Statement: Read a string and output the results of the commands FIRST, BUTFIRST, LAST, and BUT LAST.

Input: The first line of the data set for this problem is an integer that represents the number of strings that follow. Each string is on a separate line.

Output: Output is to be in 2 columns. The first column is the commands in order FIRST, BUT FIRST, LAST, BUT LAST. The second column is the result of the command. Each column is to be left-aligned with some white space between columns.

The output is to be formatted exactly like that for the sample output given below.

Assumptions: All letters are upper case.

The string contains only letters and 1 space between words.

The maximum string length is 80.

The maximum word length is 12.

The maximum number of words is 6.

Discussion:

Command	Word	Sentence
FIRST	1 st letter	1 st word
BUT FIRST	Omit 1 st letter	Omit 1 st word
LAST	Last letter	Last word
BUT LAST	Omit last letter	Omit last word

Sample Input:

3

VISIT US ON THE WEB

ADDRESS

EAGLE PASS IS IN TEXAS

Sample Output:

FIRST VISIT

BUT FIRST US ON THE WEB

LAST WEB

BUT LAST VISIT US ON THE

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FIRST A
BUT FIRST ADDRESS
LAST S
BUT LAST ADDRES

FIRST EAGLE
BUT FIRST PASS IS IN TEXAS
LAST TEXAS
BUT LAST EAGLE PASS IS IN

Problem-7 Millionaire

General Statement: Read a set of 15 correct answers for the millionaire game. Then read the contestant's responses and determine how much money the player wins.

Input: The first line of the data set for this problem is an integer that represents the number of data sets that follow. Each data set consists of 2 lines.

Line #1 is the 15 correct answers for the game, and line #2 is the list of player responses.

Output: Output a dollar sign (\$) followed by the amount won. The output is to be formatted exactly like that for the sample output given below.

Assumptions: All letters are upper case.

Discussion:

Question dollar values:

#1 \$100

#2 \$200

#3 \$300

#4 \$500

#5 \$1000

#6 \$2000

#7 \$4000

#8 \$8000

#9 \$16000
#10 \$32000
#11 \$64000
#12 \$125000
#13 \$250000
#14 \$500000
#15 \$1000000

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After question #5, \$1000 is guaranteed. After question #10, \$32000 is guaranteed.

Sample Input:

3

ABCDABCDABCDABC
ABCDABCA
ABABABCDCDCDCBCB
ABABABCD CDA
ABCABCDABCABCDA
ABCABCDABCA

Sample Output:

\$1000
\$32000
\$64000

Problem-8 Simplified Keyboard

(q)

(x₁, y₁) (x₂, y₂)

General Statement: Consider a simplified keyboard consisting of the 26 lowercase letters as illustrated below:

a	b	c	d	e	f	g	h	i
j	k	l	m	n	o	p	q	r
s	t	u	v	w	x	y	z	

$$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

We define the neighbors of a key (letter) as all the letters adjacent to it. For example, the neighbors of 'a' are {b, k, j}, neighbors of 'b' are {a, c, l, k, j}, neighbors of 'n' are {d, e, f, o, x, w, v, m}, and neighbors of 'z' are {p, q, r, y}.

The Problem:

Given two words consisting of lowercase letters only, you are to determine which of the following three cases applies to them:

1. identical: this is when the two words are of the same length and they match letter-by-letter. For example, "cool" and "cool" are identical, "cool" and "col" are not, and "cool" and "colo" are not.

2. similar: this is when the two words are of the same length, they are not identical words, and each corresponding two letters either match or are neighbors. For example, "aaaaa" and "abkja" are similar, "moon" and "done" are similar, "knq" and "bxz" are similar, but "ab" and "cb" are not (because of 'a' in the first word and the corresponding 'c' in the second word).

3. different: this is when neither of the above two cases applies to the two words, i.e., they are not identical and they are not similar. For example, "ab" and "abc" are different, "ab" and "az" are different, and "az" and "za" are different.

Input:

The first input line contains a positive integer, n, indicating the number of test cases to process. Each of the following n input lines represents a test case, consisting of two words separated by one space. Each word consists of lowercase letters only and will be between 1 and 20 letters, inclusive.

Output:

For each test case, output one line. That line should contain the digit (number) 1, 2, or 3, to indicate which of the above three cases applies to the two input words.

Sample Input:

```
7  
a k  
a a  
a z  
cool cool  
aaaaaa abkja  
ab abc  
az za
```

Sample Output:

```
2  
1  
3  
1  
2  
3  
3
```

Problem-9

Electric Bill

Encourage customers to conserve energy (and protect the environment), the electric companies typically have a lower rate for the first 1000 kilowatt-hour (KWH) of electric usage and a higher rate for the additional usage (KWH is a derived unit of energy equal to 3.6 megajoules).

Problem Statement:

Given the rate (per KWH) for the first 1000 KWH usage, the rate (per KWH) for the additional usage, and a customer's energy consumption, you are to determine the charges (bill) for the customer.

The Input:

The first input line contains two integers (each between 2 and 20, inclusive), indicating the rate/KWH for the first 1000 KWH and the rate/KWH for the additional usage, respectively. The next input line contains a positive integer, n, indicating the number of customers to process. Each of the following n input lines contains an integer (between 1 and 50000, inclusive), indicating a customer's energy consumption.

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The Output:

For each customer, print the energy consumption, followed by a space, followed by the charges.

Sample Input:

6 10
~~10~~
4
1000
1001
700
4800

Sample Output:

1000 6000
~~6000~~
1001 6010
~~6010~~
700 4200
4200
4800 44000
~~44000~~