C COMPUTER PROGRAMMING PRACTICE LABORATORY (II) (1042)：Midterm

Department of Computer Science and Engineering
National Sun Yat-sen University

April 28, 2016, 13：10 ~ 16：10 (Total 3 hours)

Name： _____	**Student ID number：** _____
Instructor： _____	

General instructions：

1. This exam has 9 pages including this cover.
2. There are 7 questions.
3. No cheating！Cheating that score will be calculated zero！
4. No calculator or translators can be used.
5. Please turn off all 3C products and remove all headphones.
6. Please name your files according to the question number.

   EX：Q1.cpp, Q2.cpp , …… and so on
7. Please compress all your archives (code files) , and named as your student ID number.

   EX：B0430400XX.ZIP
8. Make sure that your compressed file has been put in TA’s USB correctly.

1. **(15 %)** Write a program that allows the user to enter as many ages of students as needed, and finds the oldest among them. Your program should create two float variables for age---one for storing the current maximum age at a given time, and the other for the currently-entered age. Initialize the maximum age to 0 years old. In a loop, the program should allow as many age inputs from the user as the user wishes and compare the currently-entered age with the value of the maximum age, until the user signals for end of input using a sentinel value of -1. The program should then output the oldest age among all the ages entered.

Result:

*Noted that red text is entered by user.
please enter the student's age or -1 to end the program: 10 please enter the student's age or -1 to end the program: 20 please enter the student's age or -1 to end the program: 30 please enter the student's age or -1 to end the program: 40 please enter the student's age or -1 to end the program: 50 please enter the student's age or -1 to end the program: 60 please enter the student's age or -1 to end the program: 70 please enter the student's age or -1 to end the program: 80 please enter the student's age or -1 to end the program: -1 The oldest age from the list is 80.

2. **(15 %)** The price of stocks is sometimes given to the nearest eighth of a dollar; for example, 297/8 or 891/2. Write a program that computes the value of the user's holding of one stock. The program asks for the number of shares of stock owned, the whole-dollar portion of the price, and the fraction portion. The fraction portion is to be input as two *int* values, one for the numerator and one for the denominator. The program then outputs the value of the user's holdings. Your program should allow the user to repeat this calculation as often as the user wishes and will include a function definition that has three *int* arguments consisting of the whole-dollar portion of the price and the two integers that make up the fraction part. The function returns the price of one share of stock as a single number of type *double*.

Result:

*Noted that red text is entered by user.
Enter stock price and number of shares, please. Enter price as integers: dollars, numerator, denominator. 10 5 8 Enter number of shares held. 100 100 shares of stock with market price 10+5/8 have value $1062.50

3. **(15 %)** Write a program to assign passengers seats in an airplane. Assume a small airplane

with seat numbering as follows:

1 A B C D
2 A B C D
3 A B C D
4 A B C D
5 A B C D
6 A B C D
7 A B C D

The program should display the seat pattern, with an X marking the seats already assigned. For example, after seats 1A, 2B, and 4C are taken, the display should look like this:

1 X B C D
2 A X C D
3 A B C D
4 A B X D
5 A B C D
6 A B C D
7 A B C D

After displaying the seats available, the program prompts for the seat desired, the user types in a seat, and then the display of available seats is updated. This continues until all seats are filled or until the user signals that the program should end. If the user types in a seat that is already assigned, the program should say that that seat is occupied and ask for another choice.

Result:

*Noted that red text is entered by user.
Savitch Airlines. Seat Reservation Program. Reserved seats are marked 'X'. Others are available. A B C D A B C D A B C D A B C D A B C D A B C D Savitch Airlines. Seat Reservation Program. Reserved seats are marked 'X'. Others are available. Please enter your request in the form "3 C" for Row 3, Seat C. There are 7 rows. Seats are A, B, C, D. 1A X B C D A B C D

```
A B     C D
A B     C D
A B     C D
A B     C D
N or n quits, anything else continues.
y
Savitch Airlines.
Seat Reservation Program.
Reserved seats are marked 'X'. Others are available.
Please enter your request in the form "3 C" for Row 3, Seat C.
There are 7 rows. Seats are A, B, C, D.
2B
X B     C D
A X     C D
A B     C D
A B     C D
A B     C D
A B     C D
N or n quits, anything else continues.
y
Savitch Airlines.
Seat Reservation Program.
Reserved seats are marked 'X'. Others are available.
Please enter your request in the form "3 C" for Row 3, Seat C.
There are 7 rows. Seats are A, B, C, D.
4C
X B     C D
A X     C D
A B     C D
A B     X D
A B     C D
A B     C D
N or n quits, anything else continues.
n
```

4. **(15 %)** Write a grading program for a class with the following grading policies:

   a. There are two quizzes, each graded on the basis of 10 points.
   b. There is one midterm exam and one final exam, each graded on the basis of 100 points.
   c. The final exam counts for 50 percent of the grade, the midterm counts for 25 percent, and the two quizzes together count for a total of 25 percent. (Do not forget to normalize the quiz scores. They should be converted to a percent before they are averaged in.)

Any grade of 90 or more is an A, any grade of 80 or more (but less than 90) is a B, any grade of 70 or more (but less than 80) is a C, any grade of 60 or more (but less than 70) is a D, and any grade below 60 is an F.

The program will read in the student's scores and output the student's record, which consists of two quiz and two exam scores as well as the student's average numeric score for the entire course and the final letter grade. Define and use a structure for the student record. If this is a class assignment, ask your instructor if input/output should be done with the keyboard and screen or if it should be done with files. If it is to be done with files, ask your instructor for instructions on file names.

Result:

Data for the test run:

1	7 10	90 95
2	9 8	90 80
3	7 8	70 80
4	5 8	50 70
5	4 0	40 35

*Noted that red text is entered by user.

```
Construct the class of StudentRecord...
Construct the class of StudentRecord...
Construct the class of StudentRecord...
Construct the class of StudentRecord...
Construct the class of StudentRecord...
enter the student number: 1
enter two 10 point quizzes
7 10
enter the midterm and final exam grades. These are 100 point tests
90 95

enter the student number: 2
enter two 10 point quizzes
9 8
enter the midterm and final exam grades. These are 100 point tests
90 80

enter the student number: 3
enter two 10 point quizzes
7 8
enter the midterm and final exam grades. These are 100 point tests
70 80
```

```
enter the student number: 4
enter two 10 point quizzes
5 8
enter the midterm and final exam grades. These are 100 point tests
50 70

enter the student number: 5
enter two 10 point quizzes
4 0
enter the midterm and final exam grades. These are 100 point tests
40 35

The record for student number: 1
The quiz grades are: 7 10
The midterm and exam grades are: 90 95
The numeric average is: 91.25
and the letter grade assigned is: A

The record for student number: 2
The quiz grades are: 9 8
The midterm and exam grades are: 90 80
The numeric average is: 83.75
and the letter grade assigned is: B

The record for student number: 3
The quiz grades are: 7 8
The midterm and exam grades are: 70 80
The numeric average is: 76.25
and the letter grade assigned is: C

The record for student number: 4
The quiz grades are: 5 8
The midterm and exam grades are: 50 70
The numeric average is: 63.75
and the letter grade assigned is: D

The record for student number: 5
The quiz grades are: 4 0
The midterm and exam grades are: 40 35
The numeric average is: 32.5
and the letter grade assigned is: F
```

5. (**15 %**) Write a program that reads in a list of integers into an array with base type *int*. Provide the facility to read this array from the keyboard. You may assume that there are fewer than 50 entries in the array. Your program determines how many entries there are. The output is to be a two-column list. The first column is a list of the distinct array elements; the second column is the count of the number of occurrences of each element. The list should be sorted on entries in the first column, largest to smallest.

Result:

*Noted that red text is entered by user.
Please enter the number of integers: 16 -12 3 -12 4 1 1 -12 1 -1 1 2 3 4 2 3 -12 N Count 4 2 3 3 2 2 1 4 -1 1 -12 4

6. (**15 %**) Write a program to convert a whole number specified in any base (2..16) to a whole number in any other base (2..16). ``Digits" above 9 are represented by single capital letters; e.g. 10 by A, 15 by F, etc.

Input

Each input line will consist of three values. The first value will be a positive integer indicating the base of the number. The second value is a positive integer indicating the base we wish to convert to. The third value is the actual number (in the first base) that we wish to convert. This number will have letters representing any digits higher than 9 and may contain invalid ``digits". It will not exceed 10 characters. Each of the input values on a single line will be separated by at least one space.

Output

Program output consists of the original number followed by the string ``**base**", followed by the original base number, followed by the string ``=" followed by the converted number followed by the string ``**base**" followed by the new base. If the original number is invalid, output the statement

original Value is an illegal base *original Base* number

where *original Value* is replaced by the value to be converted and *original* Base is replaced by the original base value.

Sample input

2 10 10101

5 3 126

15 11 A4C

Sample output

10101 base 2 = 21 base 10

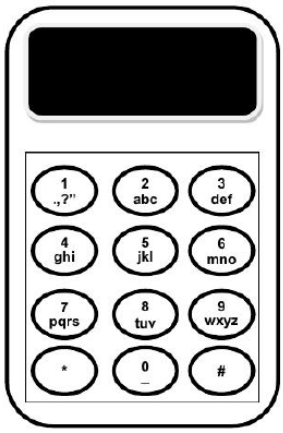
126 is an illegal base 5 number

A4C base 15 = 1821 base 11

Result:

*Noted that red text is entered by user.
2 10 10101 10101 base 2 = 21 base 10 5 3 126 126 is an illegal base 5 number 15 11 A4C A4C base 15 = 1821 base 11

7. (**10 %**) Ali is known as very much stingy. He bought an old secondhand mobile phone. He usually uses the mobile phone to receive phone calls from others and rarely makes a phone call. Suddenly, he observes that sending a mobile SMS is much cheaper than making a phone call. So he always sends a mobile SMS instead of making a phone call. Currently, his mobile phone display has got a problem that it shows nothing on the screen. It is difficult for him to write a mobile SMS. But he knows the number arrangement of his mobile keypad. Now he asks your help to find out the text he has keyed in while writing the SMS. He will let you which key he has pressed and how many times. The keypad arrangement of his mobile is given in the following picture; '_' represents the space.



Input

The input _le consists of several test cases. The _rst line of the input _le contains a single integer $T < 1000$ indicating the number of test cases. Then T test cases follow. Each test case starts with a positive integer $5 \_ L \_ 100$, which is the length of the message. Each of the next **two** lines contains L positive integers. First line contains $0 \_ Ni \_ 9$, $1 \_ i \_ L$ and second line contains $1 \_ Pi \_ 4$, $1 \_ i \_ L$. Ni are the keypad numbers which he types and *Pi* represents how many times he presses the *Ni* key.

Output

For each set of input produce one line of output *message*, where *message* indicates the desired mobile SMS. See the sample input output for further clari_cation.

Sample Input

2
17
9 3 5 2 6 6 3 0 8 6 0 4 4 8 7 2 1
1 2 3 3 3 1 2 1 1 3 1 3 3 2 1 3 1
12
4 6 9 0 2 7 3 0 9 6 8 1
2 3 1 1 1 3 2 1 3 3 2 3

Sample Output

welcome to iiupc.
how are you?

Result:

*Noted that red text is entered by user.
3 15 9 3 5 2 6 6 3 0 8 6 0 2 7 3 1 1 2 3 3 3 1 2 1 1 3 1 3 4 2 1 welcome to cse. 12 4 6 9 0 2 7 3 0 9 6 8 1 2 3 1 1 1 3 2 1 3 3 2 3 how are you? 13 1 4 3 5 5 6 0 9 6 7 5 3 1 4 2 2 3 3 3 1 1 3 3 3 1 4 "hello world"