2012/10/02 Software Studio Lab1

Honor Code

Any cheating will be handled seriously in compliance with the university rules. All assigned work is expected to be individual, except where explicitly written otherwise (e.g., term project). You are encouraged to discuss with your classmates; however, what you hand in should be your own work.

1. (15%) Write a program to count how many times a specific character occurs in a given sentence. The program should allow the user to input a sentence, assign one character **x,** and then count how many times **x** occurs in this sentence. For example, "I have a cat, two dogs, and three fish." If **x** is 'a', the result should be 4 (because 'a ' occurs four times in this sentence). There will be two input, (1) a sentence and (2) the character which is going to be counted, and one output, how many times the character occurs.

2. Palindrome
   i. (10%) A palindrome is a string that reads the same whether you read it forwards from left to right or backwards from right to left. For example, "level" and "abccba" are both palindromes. Write a program to check whether a word is a palindrome. Your program should allow users to input a string and respond an answer: "it is a palindrome" or "it is not a palindrome."

   ii. (20%) Improve your program so that it not only recognizes whether a string is a palindrome or not, but also modifies a string that isn't a palindrome by adding one character so that the modified string becomes a palindrome. For example, "1243321" is not a palindrome, but once you add a '4' between '3' and '2', then the string will change to "12433421" and it is a palindrome. Your program should not only recognize a palindrome, but also print out the modified string if a string requires modification. (There might be more than one way to add a character to turn a string to a palindrome. In such a case, just show one of the ways.) When only adding one character cannot turn a string to palindrome, the output should be "no result." Let the program keep running until insert "exit."

```
please insert a string: (insert exit to leave)
aibohphbia
new string: aibohphobia

please insert a string: (insert exit to leave)
123231
new string: 1232321

please insert a string: (insert exit to leave)
rotator
it's a palindrome

please insert a string: (insert exit to leave)
123423
no result

please insert a string: (insert exit to leave)
33 333
new string: 33 3 33

please insert a string: (insert exit to leave)
exit
leaving...
```

3. Pascal's triangle

   A Pascal's triangle is known to look like this:

Level 0	1
Level 1	1 1
Level 2	1 2 1
Level 3	1 3 3 1
Level 4	1 4 6 4 1
Level 5	1 5 10 10 5 1
⋮	⋮

   Level 0 has a single value, and any values on subsequent levels are the sum of the two entries located diagonally above in the previous level of the triangle. For example, the value 6 in level 4 is the sum of the two values 3 and 3 in level 3.

   i. (10%)Write a program to print out a Pascal's triangle. There should be one input, which defines how many levels the triangle has. The output is a Pascal's triangle from level 0 to level **x.**

```
please insert a number to assign the level
9
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
1 9 36 84 126 126 84 36 9 1
```

ii. (20%)Now, reverse the output. That means that you should print the Pascal's triangle from level **x** to level 0.

```
please insert a number to assign the level
6
1 6 15 20 15 6 1
1 5 10 10 5 1
1 4 6 4 1
1 3 3 1
1 2 1
1 1
1
```

4. (25%)Create a game to guess a four-digit number. The program will randomly generate a four-digit number **x** and the player should figure out the number within ten trials. Each time when the player enters a four-digit number **y**, the program will show the difference between **x** and **y.** If a digit in **y** has the same value and the same position with a digit in **x**, the result will be ***A***. If one digit in **y** has the same value as one of **x**'s digits but they are not in the same position, the result will be ***B***. (Note that ***A*** + ***B*** <= 4.)

   Let's clarify the definition of the game through some examples:

```
you can start to guess the number
You have 10 times now.
1234
1 A 0 B
You have 9 times now.
5678
0 A 2 B
You have 8 times now.
8721
0 A 1 B
You have 7 times now.
1769
2 A 0 B
You have 6 times now.
1780
1 A 1 B
You have 5 times now.
1859
1 A 1 B
You have 4 times now.
0329
0 A 1 B
You have 3 times now.
1169
2 A 0 B
You have 2 times now.
1664
2 A 0 B
You have 1 times now.
1068
3 A 0 B
You lose.
The answer is 1065
```

```
you can start to guess the number
You have 10 times now.
9543
1 A 1 B
You have 9 times now.
1532
0 A 2 B
You have 8 times now.
3248
0 A 1 B
You have 7 times now.
9127
0 A 0 B
You have 6 times now.
5063
2 A 0 B
You have 5 times now.
5443
2 A 0 B
You have 4 times now.
5533
2 A 2 B
You have 3 times now.
5353
4 A 0 B
You win!
```

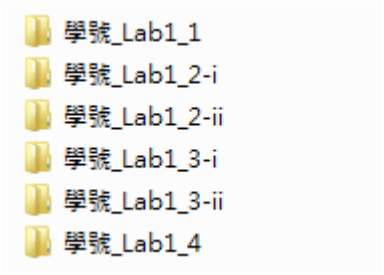
If the player enters the correct answer in less than ten times, the player will win.

If the player doesn't figure out the answer after ten guesses, the player will lose.

Show the answer when the player lose.

注意事項：

1. **Deadline: 2012/10/06 23:59 (10/07 00:00~23:59 交者，成績*0.8)**
2. 交作業時，請按照以下格式標示清楚題號：



   請在各題的資料夾放入**.java 檔**、**.class 檔**、**Readme.txt**
   再將這些資料夾一起壓縮成”**學號_Lab1.zip**”，
   將壓縮檔上傳至 http://lms.nthu.edu.tw/ 軟體實驗的**作業**區
3. 每個.java 檔內，第一行請用註解加上學號、姓名及題號。
4. 程式碼務必要有註解，說明你解題的方法。
5. Readme 請包含執行步驟(條列式)、遇到的困難及解決方法。
   以下以第 1 題的 Readme 作為範例：