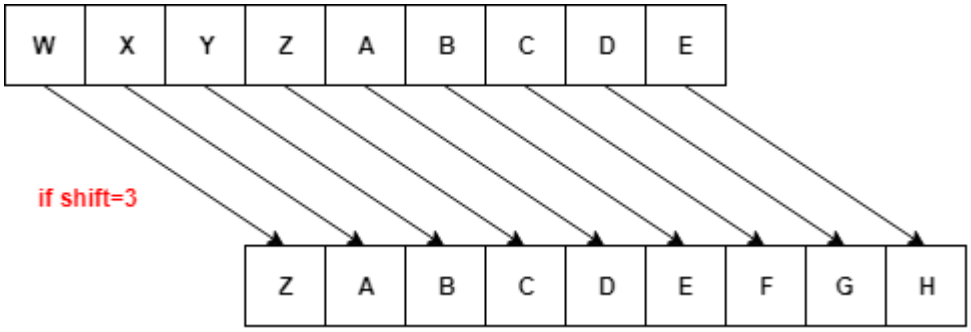
物件導向程式設計 第三次小考

Object-Oriented Programming Quiz 3

1.

在密碼學中，凱撒密碼 (Caesar cipher) 是一種最簡單且最廣為人知的加密技術。請寫出一個程式，可以輸入數字 N 與一段文字(plaintext)，輸出為文字右移 N 個字母的結果 (所謂的「右移」一個字母乃代表 A 變成 B 或是 X 變成 Y 的過程，而 Z 往右移一個字母則又會回到 A)。必須含有兩個 classes (main class 和凱撒密碼的 class) 以及要使用建構元 (放在凱撒密碼的 class 內，此將影響顯示的文字與右移的數量)，請使用以下程式碼作為框架，填寫出完整程式碼來符合上述功能。

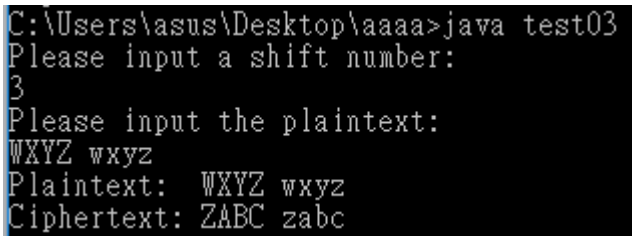
Caesar cipher is one of the most widely known encryption techniques. Your program is required to take as input a number N and a paragraph of text. The output of your program is the result of *N-space right-shift* of each alphabet in the input paragraph. Note that the *N-space right-shift* of an alphabet A is B, *N-space right-shift* of an alphabet X is Y, and *N-space right-shift* of an alphabet Z is A. Your program needs to be written based on the incomplete code below.

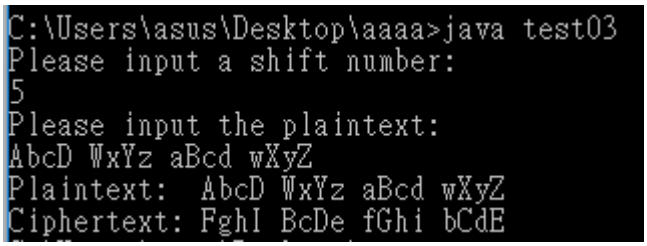



```
2  class test03
3  {
4      public static void main(String arg[])
5      {
6          int N = 0;
7          String plaintext = null;
8          // To Do
9          Caesar sar = new Caesar(plaintext, N);
10         sar.cipher();
11     }
12 }
13 class Caesar
14 {
15     public Caesar(String plaintext, int shift) // constructor
16     {
17         // To Do
18     }
19     public void cipher()
20     {
21         // To Do
22     }
23 }
```

Example:

Input:	**Output:**
3	ZABC zabc
WXYZ wxyz	





2.

請寫出一個程式讓使用者可以輸入兩個數字 *N*、*M*，並寫一個 class Number 使用實體函數 draw()印出大小為 *N*M* 的矩陣，內含 *1~N*M* 的數字。其中奇數列的數字順序為往右遞增，偶數列的數字為往左遞增。請使用以下程式碼作為框架，填寫出完整程式碼來符合上述功能。

Your program is required to take as inputs two numbers *N* and *M*. Your code needs to contain a method draw() that can print a matrix of the size of *N*M*. Your program needs to be written based on the incomplete code below.

```
class Number
{
    int N;
    int M;
    Number(int N, int M);
    int draw();
};
```

以下是範例

One example is shown below.

Input	**Output**
N=5, *M*=9	1 2 3 4 5 6 7 8 9 18 17 16 15 14 13 12 11 10 19 20 21 22 23 24 25 26 27 36 35 34 33 32 31 30 29 28 37 38 39 40 41 42 43 44 45

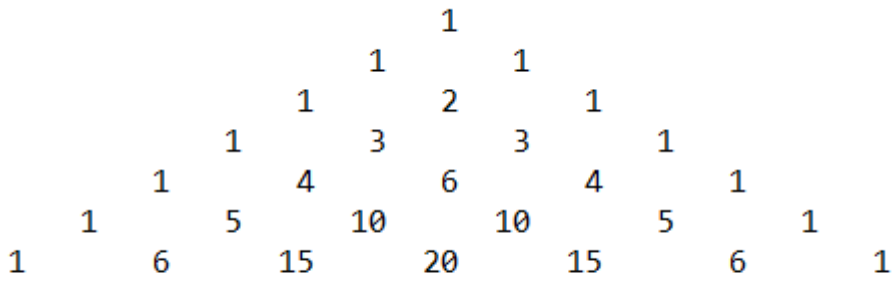
3.

請寫出一個程式讓使用者可以輸入數字 *N*，畫出高度為 *N* 的巴斯卡三角形。在你的程式碼中，必須含有**兩個 classes** (main class 和建構出三角形的 class) 與 **建構元**(放在建構三角形的 class 內，此將會影響三角形高度)。提醒一下巴斯卡三角形的每個除了兩側之外的數字都是由上一層最靠近的兩個數字加總得來。

Your program is required to take as input a number *N*, and draw the Pascal triangle with height of *N*. Your code needs to contain **two classes** (main class and another class for constructing Pascal triangle) and **one constructor** (in the class constructing Pascal triangle) setting the data member *N*. Note that each number, except those in the most right-hand side and the most left0hand side, is derived by calculating the sum of the closest two numbers in the upper level.

下圖為巴斯卡三角形的範例

An illustration of Pascal triangle is shown below.



Input	**Output**
3	1 1 1 1 2 1