物件導向程式設計 第一次小考
Object-Oriented Programming Quiz 1

1.

請寫出程式讓使用者能夠輸入一個句子，此程式可計算總共有多少個<u>不同</u>的英文字母 (大小寫視為同一種)

Your program is required to take as input a sentence and then count how many <u>distinct</u> English alphabets are in total (Lower and upper case is treated as the same.)

以下是範例

An example is shown below

Input	Output
Meow Meow !	4
The date is 2/20.	7
Have A Nice Day!	9
aa	1

2.

請寫出程式讓使用者能夠輸入兩個數字 N 與 A，請用*畫出 N 個波的圖，其中波的振幅為 A 且波形必須是等腰三角形。

Given two numbers N and A, your program is required to use "*" to draw a picture which totally has N waves with the amplitude A. Besides, the shape of every wave must be an isosceles triangle (a triangle with two equal-length edges).

範例: 下圖為振幅 A 為 3，N 為 3 的圖

Example: The following contains N=3 waves, each of which has A=3 amplitude.

```
    *           *           *
   ***         ***         ***
*************************************
   ***         ***         ***
    *           *           *
```

3.

有三根杆子 A、B、C。A 杆上有 *N* 個 (*N>1*) 穿孔圓盤，盤的尺寸由下到上依次變小。要求按下列兩條規則將所有圓盤移至 C 杆。請寫出程式讓使用者能夠輸入 *N*，並計算在該 *N* 之下，最少要移動多少次才能完成搬移的程序？並列出移動過程。(如只能回答移動幾次或是只有移動過程則只能獲得一半分數)

i. 每次只能移動一個圓盤。

ii. 大盤不能疊在小盤上面。

There are three poles A, B, and C. There are *N* (*N>1*) perforated discs on the A-rod, and the size of the disc becomes smaller from the bottom to top. It is required to move all the discs from the A-rod to the C-rod according to the following rules. Your program is required to take as input a number *N* and calculate the minimum number of movements. You are also required to list the movement process. (you get half points if you can only answer one)

1. Only one disc can be moved at a time.
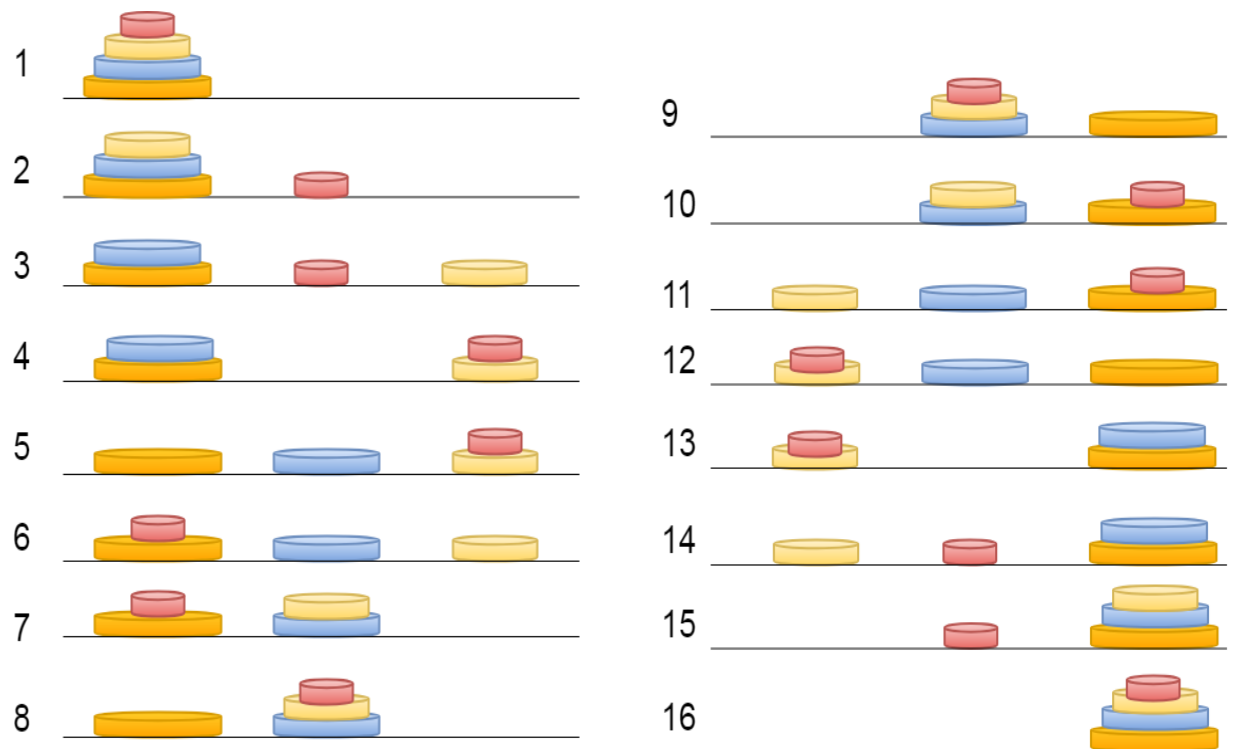2. A larger disc may not be placed on top of a smaller disc.

這是一個叫做河內塔的經典程式題目，以下是 *N=3* 的情況
This is a classic Hanoi Tower problem. The following shows the case with *N=3*.
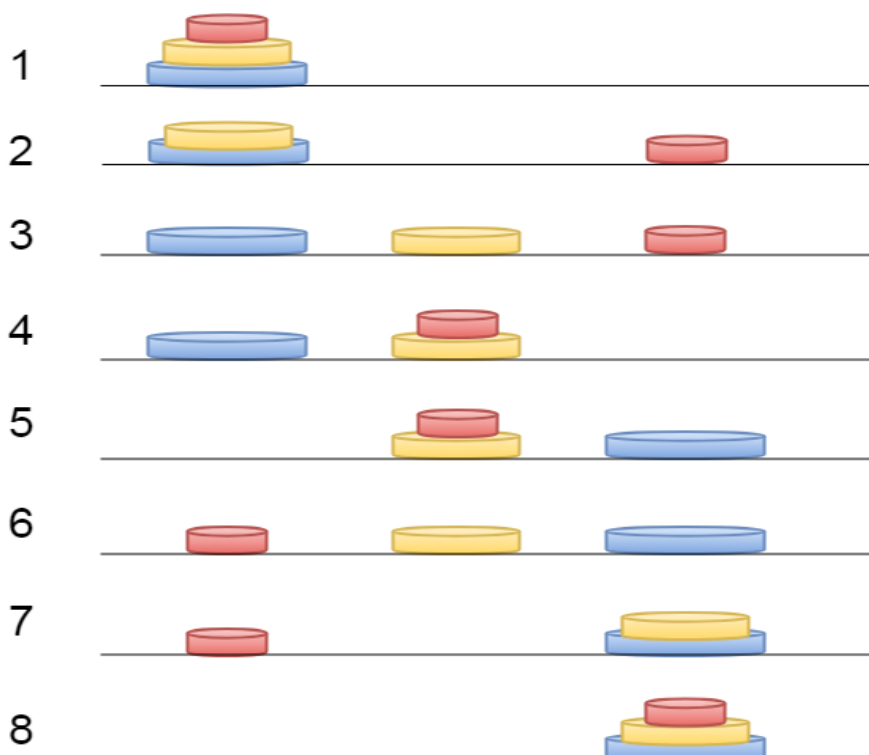
這是一個叫做河內塔的經典程式題目，以下是 *N=4* 的情況
This is a classic Hanoi Tower problem. The following shows the case with *N=4*.

1

2

3

4

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你不需要真正把上述圖案畫出來, 而只需要用以下表示法即可.

You do not need "draw" the movement process; instead, your program is required to output the following pattern.

```
請輸入盤數：3

移動 圓盤 1 從 A 到 C
移動 圓盤 2 從 A 到 B
移動 圓盤 1 從 C 到 B
移動 圓盤 3 從 A 到 C
移動 圓盤 1 從 B 到 A
移動 圓盤 2 從 B 到 C
移動 圓盤 1 從 A 到 C

移動次數：7
```

```
Enter the number of discs:3

Move disk 1 from A to C
Move disk 2 from A to B
Move disk 1 from C to B
Move disk 3 from A to C
Move disk 1 from B to A
Move disk 2 from B to C
Move disk 1 from A to C

Number of movement：7
```