Introduction to Computers and Programming LAB-5 2016/11/02

- ✧ The output must be in our sample output format.
- ✧ If you cannot finish it in time, you should demo your lab work at next lab hours.
- ✧ TAs will update lab records every Monday after the lab hours in the link: http://goo.gl/ZVJu2Y

1. Doctor Strange

source: http://marvel.com/doctorstrangepremiere

Doctor Strange is one of the most powerful sorcerers in Marvel Universe existence. Strange's magical repertoire includes energy projection and manipulation, matter transformation, animation of inanimate objects, teleportation, illusion-casting, mesmerism, thought projection, astral projection, dimensional travel, time travel and mental possession, to name a few.

Now, Doctor Strange is going to perform a magic on an array! Here is how the array to be transformed: first adds the first element to the last, abandons the first element, and reverses the order. He keeps performing this transformation until there is only one element in the array. You are going to write a program to simulate the process of the magic of array transformation. **Given the size (≦100) and every elements of the array, show the result of each transformation**. In order to comply with the law of conservation of energy, there should be one 1-dimension array all the time, no other 1-dimension arrays will be declared during the magic!

```
5
99 77 66 44 11

99 77 66 44 11
110 44 66 77
187 66 44
231 66
297
```

```
7
1 98 95 52 56 34 43

1 98 95 52 56 34 43
44 34 56 52 95 98
142 95 52 56 34
176 56 52 95
271 52 56
327 52
379
```

2. Digit Frequency

Given a number with unknown length, compute the frequency of occurrence of each digit, and find out the digit appearing the most. **Please use an array with size 10 to compute the frequency.**

```
12345678901
Digit:          0 1 2 3 4 5 6 7 8 9
Occurrences:    1 2 1 1 1 1 1 1 1 1
Appear Most:    1
```

```
20161102
Digit:          0 1 2 3 4 5 6 7 8 9
Occurrences:    2 3 2 0 0 0 1 0 0 0
Appear Most:    1
```

3. 2's Complement

Write a program that can convert a decimal number to *n*-bit binary number in 2's complement, where *n* is a number not greater than 30.

```
Please input n:4
Please input the decimal number:5
0101

Please input n:4
Please input the decimal number:8
Overflow

Please input n:4
Please input the decimal number:-2
1110

Please input n:4
Please input the decimal number:-9
Overflow
```

```
Please input n:5
Please input the decimal number:14
01110

Please input n:5
Please input the decimal number:-8
11000

Please input n:5
Please input the decimal number:32
Overflow

Please input n:5
Please input the decimal number:-30
Overflow
```

Note: Brute-force approaches are not allowed, for example:

if(number == 5) printf("0101\n");

4. Reverse by '#'

Write a program that recognize '#' and reverse all the text before it.

For example:

input: abc#def#ghi

abc#def#ghi → cba#def#ghi → cba#def#ghi → fed#abc#ghi

output: fed#abc#ghi

```
Please input text:abc#def#ghi
fed#abc#ghi
```

```
Please input text:This is an apple.#
.elppa na si sihT#
```

```
Please input text:Apple#elppaeniP#Pen#neP#
Pen#Pineapple#Apple#Pen#
```