Problem
Grammy's Puzzle

Input File: GrammyIn.txt
Output File: GrammyOut.txt
Program File: Grammy

Your Grammy is a retired English teacher who always enjoyed solving puzzles. As a retirement gift, you gave her a puzzle book that contains hundreds of hidden word puzzles. These puzzles are a square arrangement of letters (in rows and columns) that sometimes form words. To solve the puzzle, you have to locate the row and column of the first letter of a given word, and determine the orientation of the remainder of the word. Words can be oriented in any of eight directions: north, northeast, east, southeast, south, southwest, west and northwest. The orientation of a one letter word will always be north.

Grammy would like to spend some "quality time" with you solving these puzzles. Unfortunately, you hate this kind of puzzle. Rather than disappoint her, you have decided to write a program to solve the puzzle. You may assume a given word will always be in the puzzle and that there will be only one occurrence of the word in the puzzle. Assume the upper left corner of the puzzle is row 0, column 0.

Inputs
The first input to the program will be the number of rows (columns) in the puzzle (50 maximum). This will be followed by the letters in each row of the table, one row per input line. Finally, the words to be located will be given, one per line.

Outputs
Your program should output one line for each word to be located. This line will contain the row and column number where the word begins in the puzzle and an upper case letter indicating the orientation of the word: A for north, B northeast, C for east, D for southeast, E for south, F for southwest, G for west and H for northwest.

Sample input

```
10
DFRETFGTYH
JUILHOUSPU
RNBHYUJHTG
EMNJHBGRED
WDFATGHYUJ
OJNHXGYUJI
LYDFGHUJNB
FJUYHNBGTR
AHOUSEFRED
MKJHBGYPLA
HOUSE
FLOWER
AX
X
```

Sample output

```
8 1 C
7 0 A
4 3 d
5 4 A
```

Problem
Mars Mission

Input File: MarsIn.txt
Output File: MarsOut.txt
Program File: Mars

You are part of the NASA team formed to photograph Mars. Since no member of the team wanted to make the journey a photographic robot, Amanda, was sent. Amanda will fly by the planet, take monochromatic pictures with a digital camera and then transmit the digital images back to earth. One problem: the image bit stream is so long, she will be out of range before the transmission is complete.

Your job is to write a program for Amanda's on-board computer to compress the digital data prior to its transmission. Since the image data is made up of long sequences of 1's and 0's, a "count compression" technique will be used which has the potential to compress 127 image bits into one byte. In this technique the image bits are processed sequentially and compressed into eight bit groups. The left bit of the group indicates the value of the compressed sequential bits (1 or 0). The remaining seven bits form a binary number representing the number of consecutive image bits (all with the same value) compressed using this byte. For example, if the transmission begins with one hundred zeros, then the first compressed byte transmitted back to earth would be: 01100100.

Inputs
The inputs to the program will be the uncompressed image bit stream, a sequence of 1's and 0's all on one line of the file.

Outputs
Your program should output a sequence of 1's and 0's, which is the compressed version of the digital image transmitted to earth.

Sample input
```
11111111111111111111111111111111000000000000000001111111111111100000000000000000
```

Sample output
```
10100001000100011000111100010011
```

Problem
Sequence

Input File: SequenceIn.txt
Output File: SequenceOut.txt
Program File: Sequence

The first four numbers in a sequence of integers are: 1, 3, 5 and 7. Any other number in the sequence is obtained by adding the four numbers just before it, however even numbers are not used in the sum. Write a program to generate the first n numbers in the sequence.

Inputs
The number of members of the sequence to be output, n.
Outputs
The first n numbers in the sequence, each separated by a space.

Sample input
15
Sample output
1 3 5 7 16 15 27 49 91 182 167 307 565 1039 2078

Problem
Tallulah

Input File: TallulahIn.txt
Output File: TallulahOut.txt
Program File: Tallulah

Your cousin Tallulah attended El-Cheapo Institute of Secretarial Studies. She learned to take dictation backwards (read right-to-left). Her boss Ms. Know-It-All has some issues as well. She reads sentences left-to-right and is only able to recognize the uppercase alphabet. Write a program that converts cousin Tallulah's dictation to a format that her boss can understand.

Inputs

The dictation as recorded by cousin Tallulah, one dictation line per input line. There will be no more than 80 characters in a dictation line.

Outputs

The text in a form readable by Ms. Know-It-All.

Sample input

```
!gninrom dooG
yad doog a evah uoy epoh I
,sdrager
llA-tI-wonK .sM
```

Sample Output

```
GOOD MORNING!
I HOPE YOU HAVE A GOOD DAY.
REGARDS,
MS. KNOW-IT-ALL
```

Problem
Climbing Worm

Input File: WormIn.txt
Output File: WormOut.txt
Program File: Worm

An inchworm is at the bottom of a well *n* inches deep. It has enough energy to climb a certain number of inches, *u*, every minute, but has to rest for one minute before climbing again. During the rest, it slips down *d* inches. The process of climbing and resting then repeats. Of course *d* is always less than *u*. Furthermore, we will always count a portion of a minute as a whole minute and if the worm (while climbing) just makes it to the top of the well, we will declare the race over.

You and your friends are taking bets as to how long it will take the inchworm to climb to the top of the well. Since a lot of money is at stake, you have decided to write a program to determine the time, given the height of the well, the climbing speed and the distance the worm slides back while it is resting.

Inputs
One input line per race. Each line contains three integers: the height of the well (in inches) the climbing speed (in inches per minute) and the distance (in inches) the worm slides back while it is resting. An input of 0 0 0 will terminate the inputs.

Outputs
The time it takes for the worm to reach the top of the well, in minutes, one race per line.

Sample inputs
10 2 1
20 3 1
0 0 0

Sample outputs
17
19

Problem
Zip Codes

Input File: ZipCodesIn.txt
Output File: ZipcodesOut.txt
Program File: ZipCodes

Your local post office is doing a terrible job sorting the mail. Mail is to be sorted into 3 groups based on the last two digits in the 5-digit zip code. Group 1 contains all zip codes whose last two digits are evenly divisible by 4. Group 2 contains all zip codes whose last two (right most) digits are evenly divisible by 10 and not by 4. Group 3 contains all others.

No one in the post office is proficient in math and they have employed you to write a program to automate the sorting process. Given a zip code, the program will determine group number of each zip code. In addition it will sort the zip codes in each group in ascending order, according to their full zip code.

Inputs
The input will be the zip codes to be sorted (maximum of 300) on one line.

Outputs
There will be one line of output per zip code group. Group 1 will be output first followed by group 2 and finally group 3. The group number will appear first on the line followed by the zip codes in that group, in sorted order.

Sample input
11524 11740 11617 11820 11708 11531 11304 11580 11744 11590

Sample output
1 11304 11524 11580 11708 11740 11744 11820
2 11590
3 11531 11617

Problem
Sequence

Input File: SequenceIn.txt
Output File: SequenceOut.txt
Program File: Sequence

The first four numbers in a sequence of numbers are 1, 3, 5 and 7. The remaining numbers in the sequence are obtained by adding the four numbers just before it, however even numbers are not used in the sum. Write a program to generate the first n numbers in the sequence.

Inputs
The number of members of the sequence to be output, n.

Outputs
The first n numbers in the sequence, each separated by a space.

Sample input
15

Sample output
1 3 5 7 16 15 27 49 91 182 167 307 565 1039 2078