Question - 1
What is the number?

Often, we hear commercials give out their numbers with phrases. When we press for the phrases on the keypad, we are indirectly translating the phrases into numbers. Now, we want to know what are the actual numbers based on a typical keypad configuration as shown below:

Input Format:
The input contains one phone number string *s.* You can assume that the input is perfectly formed (dashed separators always provided, number starts with 1, and no illegal characters are given). Thus, you do not need to perform any specific validation checks on the input, in order to make your program simpler. However, please note that the number of dashed separators and their positions in the input phone numbers could be different. For instance, 1-800-ABC-DEFG, 1-800-AB-CDEFG, 1-800-ABCDEFG are all possible inputs.

Output Format:
The function must return a string which converts all characters in the phone number to numbers.

Sample Input 1:

```
1-800-CALL-NOW
```

Sample Output 1:

```
1-800-2255-669
```

Explanation 1:
For each letter in the String, Using the phone dial pad, we have a matching:

```
C-2
A-2
L-5
L-5
N-6
O-6
W-9
```

Sample Input 2:

```
1-800-AIRLINE
```

Sample Output 2:

```
1-800-2475463
```

Explanation 2:
For each letter in the String, Using the phone dial pad, we have a matching:

```
A-2
I-4
R-7
L-5
I-4
N-6
E-3
```

Question - 2
Maximum Sum

Given an array of integers, find the combination of integers that give the maximum sum.

Input Format:
The first line from the input contains an integer, n, denoting the number of elements in the array a.
Each line i of the n subsequent lines (where $0 \leq i < n$) contains an integer describing a_i.

Output Format:
The function must return an integer which is the maximum sum of the array.

Sample Input 1:

```
4
1
2
-3
4
```

Sample Output 1:

```
7
```

Explanation 1:
1+2+4 = 7, and adding -3 would make it smaller.

Sample Input 2:

```
4
34
-20
16
0
```

Sample Output 2:

```
50
```

Explanation 2:
34+16 = 50, adding 0 or -20 either make no change or made it smaller.

Question - 3
Simple Calculator

Create a calculator which parses a given String expression which can have pluses (+), minuses (-), and an equals sign (=) at the end of the string.

Input Format:
The input line contains an equation string s.
Constraints:
Every number in s is a single digit integer number, that is from 0 to 9.

Output Format:
The function must return the integer evaluation of the equation.

Sample Input 1:

```
1+6+2-3+0=
```

Sample Output 1:

```
6
```

Explanation 1:
1+6+2-3+0 = 6

Sample Input 2:

```
0+3-4=
```

Sample Output 2:

```
-1
```

Explanation 2:
0+3-4 = -1

Question - 4
One Up

Given an integer encoded as an array of its digits, that is, 1234 = [1,2,3,4], compute the integer+1 and return it in an array of digits.

Input Format:
The first line of the input contains an integer, n, denoting the number of elements in array a.
Each line i of the n subsequent lines (where $0 \le i < n$) contains an integer describing a_i.

Output Format:
The function must return an array which contains the digits of the incremented integer.

Sample Input 1:

```
4
1
2
3
4
```

Sample Output 1:

```
1
2
3
```

```
5
```

Explanation 1:
1234+1 = 1235

Sample Input 2:
```
3
1
0
9
```

Sample Output 2:
```
1
1
0
```

Explanation 2:
109+1 = 110

Question - 5
Perfect Number

A positive integer is a perfect number if it is equal to the sum its positive divisors less than itself. Given a positive integer, confirm whether the number is a perfect number using 1 as True, 0 as False.

Input Format:
The input line contains an integer i.

Output Format:
The function must return 0 for false, 1 for true to indicate whether i is perfect.

Sample Input 1:
```
28
```

Sample Output 1:
```
1
```

Explanation 1:
1+2+4+7+14 = 28, then 28 is a perfect number. Note, 28 should NOT be used be used, because it is NOT less than itself.

Sample Input 2:
```
12
```

Sample Output 2:
```
0
```

Explanation 2:
1+2+3+4+6 = 16 > 12, then 12 is not a perfect number.

Question - 6
Can It Be A Palindrome?

A palindrome is a word, phrase, or sequence that reads the same backward as forward. For example, "madam" is the same forward and backward.

Given a string with characters, if we can construct a palindrome using any permutation of all the characters in the string, return 1 as true, otherwise return 0 as false.

Input Format:
The input contains one input string *s.*

Output Format:
The function must return 1 if the string can be made into a palindrome, 0 otherwise.

Sample Input 1:

    civic

Sample Output 1:

    1

Explanation 1:
"civic" itself is a palindrome.

Sample Input 2:

    vicci

Sample Output 2:

    1

Explanation 2:
"vicci" itself is not a palindrome. However, "civic" is one possible variation using the characters in "vicci", which is a palindrome.

Sample Input 3:

    bobby

Sample Output 3:

    0

Explanation 3:
There are no variations of b-o-b-b-y to make a palindrome. Please note that the variation must use all the characters and has the same length as the original string. For instance, "bob" should NOT be considered as a valid variation.

Sample Input 4:

    there

Sample Output 4:

    0

Explanation 4:
There are no arrangements of t-h-e-r-e where we can make a palindrome.

Question - 7
Word Mutation

Given a list of words, determine whether there exists an mutation order of the words, such that for every word in the list, the next word can be made by changing only 1 letter in the

word. Return 1 if such an order exists, otherwise return 0.

Input Format:
The first line of the input contains an integer, n, denoting the number of strings in the array a.
Each line i of the n subsequent lines (where $0 \le i < n$) contains a string describing a_i.

Output Format:
The function must return 1 for the list that has a valid mutation order, 0 otherwise.

Sample Input 1:

```
4
hee
hey
bee
hay
```

Sample Output 1:

```
1
```

Explanation 1:
We can reorder the list of the words as ["bee", "hee", "hey", "hay"], so that:
"bee" can be changed into "hee" by replacing the first letter "b" with "h".
"hee" can be changed into "hey" by replacing the last "e" with "y".
"hey" can be changed into "hay" by replacing the middle "e" with "a".

Sample Input 2:

```
3
blue
cars
mars
```

Sample Output 2:

```
0
```

Explanation 2:
It is NOT possible to form a list using these three words, because "blue" cannot be changed into "cars" or "mars" by replacing only one word.

Question - 8
Island Counting

Given an N by N 2-D array filled with 1's and 0's that are representative of a map. 1's represent land and 0's represent water.
Count the number of islands on the map, where islands are described as groups of 1's adjacently connected (No diagonals)

Input Format:
The first line contains an integer, m, denoting the number of rows in array a.
The second line contains an integer, n, denoting the number of columns in array a.
Each line i of the m subsequent lines (where $0 \le i < m$) contains n integers describing a_{in}.

Constraints:

m = n for all maps given.

Output Format:
The function must return an integer representing the number of islands in the map given.

Sample Input 1:

```
4
4
1 0 1 0
1 1 0 1
0 0 0 1
0 1 0 1
```

Sample Output 1:

```
4
```

Explanation 1:
There are 4 distinct landmasses represented by 1's.

Sample Input 2:

```
5
5
1 1 1 1 1
1 0 0 0 1
1 0 1 0 1
1 0 0 0 1
1 1 1 1 1
```

Sample Output 2:

```
2
```

Explanation 2:
There are 2 distinct landmasses denoted as 1's.