Exercise F

Section F. Examples involving String Handling

1. Program to count the number of vowels in a given phrase and print out the number of each vowel. (a, e, i, o & u are vowels)
   a. Write a program to read a phrase from the console and count the number of vowels there are in the phrase. You should substring one character at a time and match it to the vowels and increment the counter.
   b. Modify the above program to make your program explicitly count the number of occurrences of each vowel. For example: number of a's, number of e's etc.)

2. Write a C# program to determine if a given string is a palindrome.
   a. Your program should take a string from the console and test if the word is a palindrome:
      - A palindrome is a word/phrase that reads the same forwards or backwards.
      - Examples: ABBA, 747, radar, madam

3. Modify program 2 to accommodate sentences which may have upper case letters, punctuation or space that may need to be ignored while doing the test.
   - Examples:
     A Santa at NASA
     Mr. Owl ate my metal worm

4. The C# language gives facilities for changing cases all to upper or lower - however, not to title case. Write a program that would convert a given sentence/phrase to title case. Example
   "institute of systems science" => "Institute Of System Science"

5. The marks obtained by five students in Programming course are as below:

Name	Mark
John	63
Venkat	29
Mary	75
Victor	82
Betty	55

   Write a program that would take store the above information in two arrays (one for Name and one for Marks. The program would then print two reports:

   a. First report sorted in descending order of the Marks (i.e. student rank)
   b. Second report sorted on student names alphabetically.

6. In Neverland University, each student is identified by their matriculation number. The format of matriculation number is A00000X (alphabet A followed with 5 digits and another alphabets). The last alphabet is called as the checksum.

The checksum can be used to validate the matriculation number. The calculation to determine the checksum is as follow:

Steps	Example (A56742)	Result
Take the first number digit and multiply with 6	5 * 6	30
Take the second digit and multiply with 5	6 * 5	30
Take the third digit and multiply with 4	7 * 4	28
Take the fourth digit and multiply with 3	4 * 3	12
Take the fifth digit and multiply with 2	2 * 2	4
Calculate the sum	30 + 30 + 28 + 12 + 4	104
Divide by 5 and take the remainder	104 % 5	4
Obtain the checksum based on the remainder value: Remainder | Checksum 0 | O 1 | P 2 | Q 3 | R 4 | S	4 mapped to "S"	"S"

Based on the above example, A56742S is a valid matriculation number, while A56742O is not.

Write a program that will ask the user to enter a matriculation number and returns whether the matriculation number is valid or not. Specifically the program should do the following:

- Check that the length of the input is exactly 7 characters, otherwise it's invalid
- Convert the entire string to uppercase so that we don't have to worry about case
- Calculate the checksum based on the rule.
- Check whether the last character matches the calculated checksum.

Sample outputs:

```
Enter a matriculation number: A56742A
Invalid

Enter a matriculation number: A56742S
Valid
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