MILLAT UMIDI UNIVERSITY

COURSE OF COMPUTER SCIENCE
LABORATORY PRACTICE n. 10

Exercise 1:

A text file contains an unknown number of integer values, separated by one or more spaces or by a "new line" character. Write down a program which, by reading such a file only once (the file name should be asked to the user), computes and displays on screen: the number of values contained in the file, their sum, as well as the maximum and minimum values among them.

Example: Assume the following file contents:

```
 23 47    11
-3     12  -24  9  0
   8
```

Then, the program should display the following messages:

```
Number of values: 9
Overall sum: 83
Maximum value: 47
Minimum value: -24
```

Exercise 2:

Write down a program which loads the name of a text file from the keyboard and, by reading it only once, computes and prints out the following statistics on the text there contained:

- Total number of rows
- Total number of characters
- Number of digits (characters '`0`', '`1`', ..., '`9`')
- Number of capital letters ('`A`', '`B`', ..., '`Z`')
- Number of small letters ('`a`', '`b`', ..., '`z`')
- Number of spacing characters (' ', '`\t`', '`\n`', etc.)
- Number of punctuation characters ('`.`', '`,`', '`:`' , '`;`' , '`?`' , '`!`')
- Number of characters not included in the previous categories

Exercise 3:

Write down a Python program in order to "justify" a given text, i.e., to rewrite it in such a way that all its lines have a fixed standard length (let `LENGTH`, a predefined constant, be the value of such an amount), with all the words inside the same line being separated by (approximately) the same number of spaces.
The text is contained in a file and it is composed by an unknown number of lines. The justified text must be written into another file: the two file names should be received by the program as command line parameters. Assume that:

- Every row of the input file has a length which is smaller than `LENGTH`.
- Every row of the input file contains at least two words.
- All the words belonging to the same row of the input file are separated by exactly one space.

Example: Assume `LENGTH` =60 and the following contents for the input file:

```
This text is just an example.
This row is short.
This row is much longer than the previous ones.
```

Then, the output file contents should be:

```
This        text       is       just       an       example.
This               row              is              short.
This   row   is   much   longer   than  the  previous  ones.
```

Exercise 4:

A university secretary makes available to a professor a text file (named "`students.txt`"), where, for each row, the name and the matricula of a student is reported. At the end of his course, the teacher provides another file ("`marks.txt`") in which he writes, for each line, the matricula of a student and the *two* marks the student obtained. No correspondence between the rows of the two files can be assumed. The total number of students is unknown, but limited to 200.
Write a program which, by reading such files only once, prints on screen, for each student, his name and the final mark he got. The final mark is:

- `FAIL` if at least one of the marks is less than 15 or their average is less than 18.
- The average of the two marks (approximated to the first larger integer value) otherwise.

Example: Assume the following contents for the two input files:

```
 students.txt               marks.txt
MickeyMouse 1575           7302  28 30
DonaldDuck  7302           1575  14 26
Goofy       4529           4529  23 16
```

Then, the following messages should be displayed (the order is not relevant):

```
Goofy       20
MickeyMouse FAIL
DonaldDuck  29
```

Exercise 5:

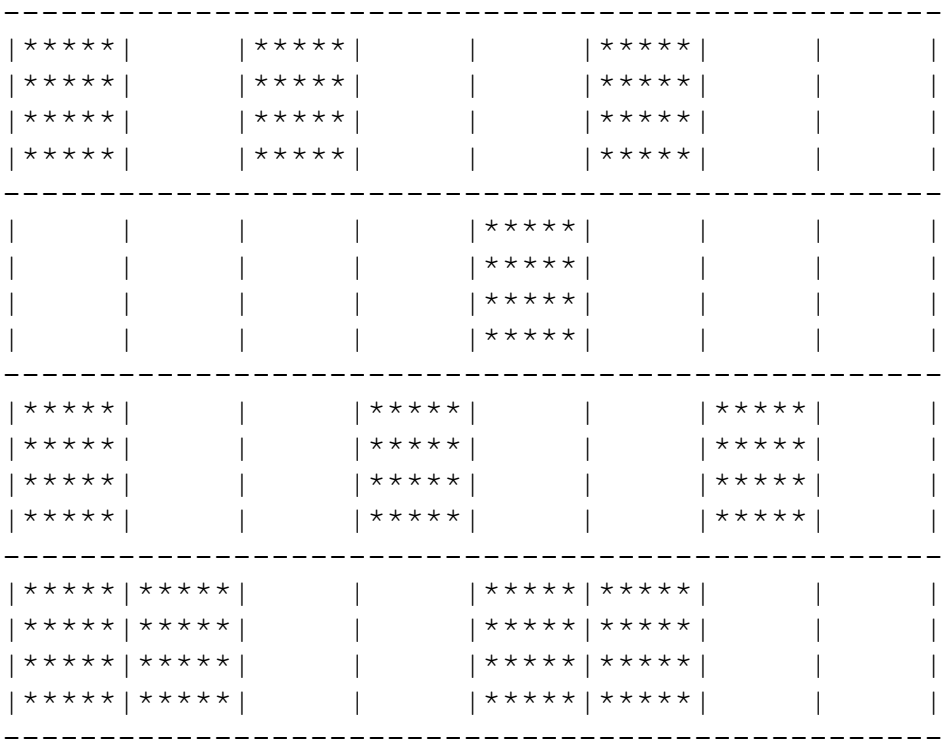
A bi-dimensional matrix with unknown sides (however limited to 20 rows and 20 columns) represents a crossword puzzle. Each element of this matrix corresponds to one cell of the puzzle, and it may assume only values 0 and 1, for a white or black cell, respectively.
Write a C program able to:

- Read from the keyboard the name of the file in which the matrix is stored.
- Load the matrix from such file.
- Draw the crossword scheme, according to the following example.

Example: let the matrix stored in the file be:

```
10100100
00001000
10010010
11001100
```

Then, the program must display the following scheme:



Finally, modify the program in order to label all the white cells corresponding to the positions where the answer to the (vertical and horizontal) puzzle definitions start. To this respect, notice that a (white) cell must be numbered if and only if:

- The cell below it is white and there are no white cells above it, OR
- The cell on the right is white and there are no white cells on the left

Example: given the same matrix of the previous example, the program should now display the following scheme: