

<u>SURNAME:</u>		<u>NAME:</u>		<u>D1</u>
<u>STUDENT ID:</u>				
<u>PROFESSOR:</u>				

Question 1	Answers:
<p>Compute the following sums on 8 bits, first considering the numbers in two's complement (2C) and then in signed magnitude (SM) representation. Report the answers as decimal numbers (DEC) and if there is or not overflow (OV).</p> <p>a. 10011111 + 10110011 b. 01011111 + 00101011</p>	<p>a: 2C_____ DEC_____</p> <p>OV_____</p> <p>b: SM_____ DEC_____</p> <p>OV_____</p>
<p><i>Report the most relevant steps</i></p>	

Question 2
<p>Write the truth table of the following boolean function $f = A'(B+C') + ABC + C'A'$</p>
<p><i>Report the most relevant steps</i></p>

Question 3
<p>Given a function that receives a vector as parameter, explain if it is necessary and what is the purpose of passing the vector dimension as further parameter.</p>

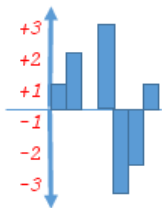
The Dr. Henry Jekyll is monitoring the effects of a new drug on the neural impulses. The values recorded from the test are reported in a text file as a histogram with vertical bars. The vertical bars, which correspond to the sampled values of the test, are represented in the file by columns composed of 'X' symbols. The sampled values are integer number from $-N$ to N , where N is defined in advance with `#define`. The file has $2 \times N$ rows and a maximum number of columns equal to 100. The empty parts are always represented by whitespace characters.

The file rows are considered numbered from the top to the bottom from 1 to $2 \times N$. The first N lines represent bars with a positive value, while the remaining N lines represent bars with a negative value. In particular, the positive bars start from the row N and go up, while the negative ones start from the line $N+1$ and go down (see example below). The value 0 corresponds to a column without 'X' symbols (no bar).

Example with $N=3$

```
input.txt
  X
 X X
XX X  X
   XX
   XX
  X
```

The file `input.txt` represents the following histogram:



Write a C program that receives from the command line:

- As first parameter, the text file name with the bar histogram
- As second parameter, a text file name where to store the results.

The program have to:

- Write in the second file, the values sampled for any bar in the text file in a numeric format, separated by a whitespace.
- Print on the screen the maximum sampled value and its position (i.e. the number of the bar which it belongs, considering that the numbering starts from 1 and proceeds from left to right).

Assume that the input file format is correct, and that exist only one maximum value.

Execution example:

```
>histogram.exe input.txt output.txt
```

Assuming that the `input.txt` file is the one shown above, the content of `output.txt` will be:

```
1 2 0 3 -3 -2 1
```

On screen message:

The maximum value is 3, in position 4.

<u>SURNAME:</u>		<u>NAME:</u>		<u>D2</u>
<u>STUDENT ID:</u>				
<u>PROFESSOR:</u>				

Question 1	Risultato
<p>Compute the following sums on 8 bits, first considering the numbers in two's complement (2C) and then in signed magnitude (SM) representation. Report the answers as decimal numbers (DEC) and if there is or not overflow (OV).</p> <p>a. 10011101 + 10110011</p> <p>b. 01011101 + 00101011</p>	<p>a: 2C_____ DEC_____</p> <p>OV_____</p> <p>b: SM_____ DEC_____</p> <p>OV_____</p>
<p><i>Report the most relevant steps</i></p>	

Question 2
<p>Write the truth table of the following boolean function</p> $f = A'(B+C') + A'BC + C' + A'$
<p><i>Report the most relevant steps</i></p>

Question 3
<p>Considering the main functions that operate on strings (e.g., <code>strcpy</code>), explain how these functions operate without knowing the length of the strings received as parameters and describe the problems that may derive from them.</p>

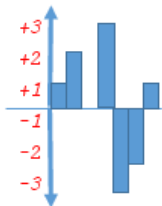
The Dr. Henry Jekyll is monitoring the effects of a new drug on the neural impulses. The values recorded from the test are reported in a text file as a histogram with vertical bars. The vertical bars, which correspond to the sampled values of the test, are represented in the file by columns composed of 'X' symbols. The sampled values are integer number from $-N$ to N , where N is defined in advance with `#define`. The file has $2 \times N$ rows and a maximum number of columns equal to 100. The empty parts are always represented by whitespace characters.

The file rows are considered numbered from the top to the bottom from 1 to $2 \times N$. The first N lines represent bars with a positive value, while the remaining N lines represent bars with a negative value. In particular, the positive bars start from the row N and go up, while the negative ones start from the line $N+1$ and go down (see example below). The value 0 corresponds to a column without 'X' symbols (no bar).

Example with $N=3$

```
input.txt
  X
 X X
XX X  X
   XX
   XX
   X
```

The file `input.txt` represents the following histogram:



Write a C program that receives from the command line:

- As first parameter, the text file name with the bar histogram
- As second parameter, a text file name where store the results.

The program have to:

- Write in the second file, the values sampled for any bar in the text file in a numeric format, separated by a whitespace.
- Print on the screen the average value with a precision of 2 decimal digits.

Assume that the input file format is always correct.

Execution Example:

```
>histogram.exe input.txt output.txt
```

Assuming that the `input.txt` file is the one shown above, the content of `output.txt` will be :

```
1 2 0 3 -3 -2 1
```

On screen message:

```
The average is 0.28
```