

<u>SURNAME:</u>		<u>NAME:</u>		<u>A1</u>
<u>MATRICOLA:</u>				
<u>PROFESSOR:</u>				

Question 1	Answers
<p>Compute the sum of the following numbers, when represented in pure binary (PB) and in two's complement (2C) on 8 bits. For any operation, indicate if there is overflow or not.</p> <p>X = 10111111 Y = 10101011</p>	<p>PB: X + Y = _____ overflow? _____</p> <p>2C: X + Y = _____ overflow? _____</p>
<p>Report ALL steps</p>	

Question 2
<p>Determine if the following relation is true or false, by using a truth table: $A' + (A \times B) = A \times B'$</p>
<p>Report ALL the steps</p>

Question 3
<p>Describe the character encoding standard called ASCII.</p>

Question 4 (PROGRAMMING)

Write a C program for handling the database of accesses to a corporate building. Data are stored in a file, whose name is passed as a command line parameter. Each line in the file contains the following fields: the ID of the Entrance Gate, the Employee ID, a flag distinguishing between enter (0) and exit (1), and the access time. An example of file (`accesses.txt`) is the following:

```
2 450 0 09:01:22
1 21 0 09:03:18
2 715 0 09:09:01
1 450 1 17:05:12
1 715 1 18:01:57
1 21 1 19:55:22
```

Assume that:

- The number of lines in the file is NOT known in advance, and fields are separated by spaces and the file format is correct
- The Entrance Gate ID is an integer composed of at most 2 digits
- The Employee ID is an integer composed of at most 3 digits
- The access time is in the format HH:MM:SS
- All accesses in the file correspond to the same day and are chronologically ordered (increasing order)
- An employee can enter and exit the building more times a day, but each entering has a corresponding leaving before midnight
- The maximum number of employees is 1000.

The program receives two arguments from the command line: (1) the file name of the database, and (2) an option.

If the option is “-v” (“view”), the program shall print: for each Employee ID having at least an access, the total time of the staying in the building, expressed in the format HH:MM:SS.

If the option is “-r” (“ranking”), the program shall print the Employee IDs with the maximum and minimum staying time.

For example:

```
C:\> prog.exe accesses.txt -v
ID 450: 08:03:50
ID 21: 10:52:04
ID 715: 08:52:56

C:\> prog.exe accesses.txt -r
Maximum time in the building: ID 21
Minimum time in the building: ID 450
```

<u>SURNAME:</u>		<u>NAME</u>		<u>A2</u>
<u>STUDENT ID:</u>				
<u>PROFESSOR:</u>				

Question 1	Answers
<p>Compute the sum of the following numbers, when represented in pure binary (PB) and in two's complement (2C) on 8 bits. For any operation, indicate if there is overflow or not.</p> <p>X = 00110111 Y = 10101110</p> <p>Report ALL steps</p>	<p>PB: $X + Y =$ _____ overflow? _____</p> <p>2C: $X + Y =$ _____ overflow? _____</p>

Question 2
<p>Determine if the following relation is true or false, by using a truth table: $A + (A \times B') = A' \times B'$</p> <p>Report ALL the steps</p>

Question 3
<p>Describe how real numbers are encoded using the IEEE 754 standard.</p>

Question 4 (PROGRAMMING)

Write a C program for handling the database of accesses to a corporate building. Data are stored in a file, whose name is passed as a command line parameter. Each line in the file contains the following fields: the Employee ID, a flag distinguishing between enter (0) and exit (1), the access time, and the access day. An example of file (`accesses.txt`) is the following:

```
450 0 09:01:22 01/04/2018
21 0 09:03:18 01/04/2018
715 0 09:09:01 01/04/2018
450 1 17:05:12 01/04/2018
715 1 18:01:57 01/04/2018
21 1 19:55:22 01/04/2018
```

Assume that:

- The number of lines in the file is NOT known in advance, and fields are separated by spaces and the file format is correct
- The Employee ID is an integer composed of at most 3 digits
- The access time is in the format HH:MM:SS, while the access day is in the format DD/MM/YYYY
- All accesses in the file correspond to only one day, in the example (01/04/2018) and are chronologically ordered (increasing order)
- An employee can enter and exit the building more times a day, but each entering has a corresponding leaving before midnight
- The maximum number of employees is 1000.

The program receives two arguments from the command line: (1) the file name of the database, and (2) an option.

If the option is “-v” (“view”), the program shall print: a) the access day; b) for each Employee ID having at least an access, the total time of the staying in the building, expressed in the format HH:MM:SS.

If the option is “-r” (“ranking”), the program shall print the Employee IDs with the maximum and minimum staying time.

```
C:\> prog.exe accesses.txt -v
Date: 01/04/2018
ID 450: 08:03:50
ID 715: 08:52:56
ID 21: 10:52:04

C:\> prog.exe accesses.txt -r
Maximum time in the building: ID 21
Minimum time in the building: ID 450
```