CS1: Challenge 0 (Algorithm and Integer coding)

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1 Remark about the format of the files that can be submitted

1.1 Comments

C99 (and following) comments are allowed in the submission:

1. Multiple lines comments between `/*` and `*/`;
2. Single line comments following the symbols `//`.

The comments are automatically suppressed by CAFÉ.

1.2 Write an answer

The lines that do not contain a comment are considered as an answer. Here is an example. If the question is: "What is the color of Napoleon white's horse?"[1], the template will indicate the number of the question and the expected format (between brackets):

```
/*
0.2 [1 word, small case characters]
*/

white
```

As it can be seen, one just has to write "white". Blank lines may be added. It is recommended to be case insensitive during the correction.

1.3 Answers separator

Each answer is separated by a `"#"`. For the user's convenience, it is recommended to always provide a template in which the places of the expected answers are already delimited by the `#` symbols.

Important note: By experience, some users will erase or modify the position of the `#`. Even if the instructions mention to not do it!

To not answer a question, one just has to left it blank. A blank answer must be at least one white-space character (e.g., a newline one).

For the user's convenience, it is recommended to remind the questions in the template by using comments. Using an editor that recognized the C syntax makes the template filling straightforward.

[1] This is the most well-known trivial question in French.

Example :

```
...
#
/*
17. [A number in base 10 that represents the question number]
*/

17

/* Please write above the answer to question 17.*/
#
...
```

2 Challenge 0 – Instructions

This challenge addresses the notion of algorithm and integer coding. Fill in the template file with your answers.

Question 1 This question is about Russian peasant multiplication https://en.wikipedia.org/wiki/Ancient_Egyptian_multiplication#Russian_peasant_multiplication

Apply the Russian peasant multiplication to compute:

- 74×48
- 34×23

In the template, you must indicate the steps of your calculation as an array. Here is how to do it:

- '|' is the column separator;
- the newline ('\n') is the line separator;
- the array must have 4 columns : multiplicand, multiplier, reminder, and partial sum. Do not add any title to the columns. Just follow their order.
- In each arrray cell, do not write a calculation: just a number.

Example for 123×68 Here is what is expected by CAFÉ:

```
  123 | 68 | 0 |    0
  246 | 34 | 0 |    0
  492 | 17 | 1 |  492
  984 |  8 | 0 |  492
 1968 |  4 | 0 |  492
 3936 |  2 | 0 |  492
 7872 |  1 | 1 | 8364
```

The final result is thus indicated in the bottom-right cell. Assume that in the multiplication $a \times b$, a is the multiplicand and b the multiplier.

Question 2 Convert the following decimal (positive) numbers into 16 bits binary numbers.

- 842
- 3242

For each number, you must provide the proper binary number and express the decimal number as a sum of powers of 2 (example: $128 + 64 + \ldots$). The terms order in the sum is not relevant.