

# IFE1 – Final exam

Duration: 1h00

*Only one double-sided handwritten A4 sheet is allowed as a document.*

*All other documents or any other electronic devices are prohibited.*

*Scale given as an indication ( $\pm 1$ )*

**Note: You can write the requested algorithms in pseudo-code or in C language. The complete header of the requested subroutines must be provided.**

## Exercise 1 – Code analysis (8 points)

Given the following C code, write as precisely as possible what will be displayed on the screen:

```
#include <stdio.h>

int a(int b);
int b(int b, int* c);

int main() {
    int c = 3;
    int d = 5;

    printf("%d\n", c);
    printf("%d\n", a(c));

    d = a(d) + 1;

    printf("%d\n", b(c, &d));
    printf("%d\n", b(d, &d));

    return 0;
}

int a(int b) {
    int d = 1;
    printf("%c\n", 'a');
    return d + 1;
}

int b(int b, int* c) {
    *c = 2 * b + 1;
    return b + 2;
}
```

## Exercise 2 - Sub-sequence detection (12 points)

Write the algorithm that:

- Given an array of  $n$  integers **T1** and a second array of  $m$  integers **T2**.
- Returns TRUE if the sequence of integers **T2** is included within the sequence of integers **T1** and FALSE otherwise.

For instance:

- If  $T1 = \{1, 2, 3, 4, 5, 6, 7\}$  and  $T2 = \{2, 3, 4\}$  then the algorithm will have to return TRUE because the sequence  $\{2, 3, 4\}$  exists in  $T1 : \{1, \underline{2, 3, 4}, 5, 6, 7\}$ .
- On the other hand, if  $T1 = \{1, 2, 3, 4, 5, 6, 7\}$  and  $T2 = \{2, 4, 3\}$ , then the algorithm will return FALSE because  $\{2, 4, 3\}$  does not exist in  $T1$ .