

## CMPT125, Fall 2021

### Sample in-lab exam

Wednesday, November 17, 2021

You need to implement the functions in ***sample.c***.

You have 50 minutes to solve all 3 problems.  
The maximal score is 20 points.

The assignment will be graded both **automatically** and by **reading your code**.

**Correctness:** Make sure that your code compiles without warnings/errors, and returns the required output.

**Readability:** Your code should be readable. Add comments wherever necessary. If needed, write helper functions to break the code into small, readable chunks.

**Compilation:** Your code **MUST** compile in CSIL with the Makefile provided. If the code does not compile in CSIL, the grade on the assignment is 0 (zero). Even if you can't solve a problem, make sure it compiles.

**Helper functions:** If necessary, you may add helper functions to the .c file.

**main() function:** do not add main(). Adding main() will cause compilation errors, as the main() function is already in the test file.

**Using printf()/scanf():** Your function should have no unnecessary printf() statements. They may interfere with the automatic graders.

**Warnings:** Warnings during compilation will reduce points. More importantly, they indicate that something is probably wrong with the code.

**Testing:** An example of a test file is included. Your code will be tested using the provided tests as well as additional tests. You are *strongly encouraged to write more tests* to check your solution is correct, but you don't need to submit them.

You need to implement the functions in ***sample.c***.  
If necessary, you may add helper functions to the sample.c file,  
but you should not add main() to the file.  
Submit only the ***sample.c*** file to Canvas.

### Question 1 [7 points]

Write a function that gets two arrays of int and checks if every value of one is contained in another. For example:

- contains({1, 2, 3}, {3, 1, 1, 3, 4, 2}) needs to return true
- contains({1, 2, 3}, {3, 1, 1, 3, 4, 5}) needs to return false because 2 is not in the second array

```
// a1 is an array of length len1
// a2 is array of length len2
// returns true if every value of a1 is contained in a2
bool contains(const int* a1, int len, const int* a2, int len2);
```

### Question 2 [6 points]

Write a function that gets a string containing words separated by (one or more) spaces. The function returns the length of the last word. For example:

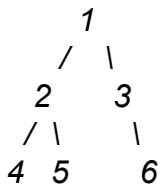
- last\_len("Hello hello") needs to return 5
- last\_len("To bE Or not to bE ") needs to return 2
- last\_len(" WhO Am I") needs to return 1

You may assume the string contains only uppercase and lowercase letters, and spaces, and it contains at least one letter.

```
// returns the length of the last word in str
int last_len(const char* str);
```

### Question 3 [7 points]

Write a function that gets a root of a binary tree with int values, and returns the sum of the numbers in the tree. If the tree is empty, the function returns 0. For example, on input



The function returns  $1+2+3+4+5+6=21$ .

```
// gets a root of a binary tree, and returns the sum of all
// numbers in it
// if the tree is empty, returns 0
int BT_sum(const BTreeNode_t* root);
```