# 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**.
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**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:*

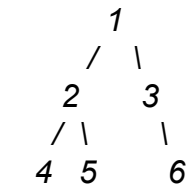
- *last_len("Hello hello") needs to return 5*
- *last_len("To  bE  Or  not to  bE ") needs to return 2*
- *last_len("  WhO  Am I") needs to return 1*

*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 linked list. 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 BTnode_t* root);
```