

CMPT125, Fall 2022

Lab exam - 11:30am-12:20pm

Thursday, November 10, 2022

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

Submit only the **.c** file to Coursys

Coursys Assignment - **Lab Exam D103-D104 11:30-12:20.**

You have 50 minutes to solve all 3 problems.

The maximal score is 20 points.

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

You can run your code using

```
>> make
```

```
>> ./run_test
```

Correctness: Make sure that your code compiles without warnings/errors, and works as expected.

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 not have any 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.

Question 1 [7 points]

Write a function that gets a pair of 2d arrays, and returns the number of coordinates $[i][j]$ in which the two arrays are equal. For example,

- If $ar1 = [[1,2,3], [4,5,6], [7,8,9]]$, and $ar2 = [[1,1,1], [3,3,6], [-7,8,9]]$ the function returns 4.

```
// the function gets two 2d-arrays.  
// returns the number of coordinates [i][j],  
// in which the two arrays are equal.  
int count_equal_2d_arrays(int h, int w,  
                          const int ar1[h][w], const int ar2[h][w]);
```

Question 2 [7 points]

Write a function that gets an array of strings of length $n>0$, and returns the number of distinct strings in the array. For example:

- On input = ["Hello", "Hello", "hi", "Hi", "Hello", "Hi"] the function returns 3.
- On input = ["A", "B", "C", "D", "E"] the function returns 5.
- On input = ["c++", "c++", "c++", "c++", "c++"] the function returns 1.

Two strings are distinct if $\text{strcmp}(\text{str1}, \text{str2}) \neq 0$.

```
// the function gets ar of strings of length n>0  
// and returns the number of distinct elements in the array  
int count_distinct(char** ar, int n);
```

Question 3 [6 points]

Write a function that gets a linked list of ints, and an index i , and returns the value in the i 'th node of the list (counting from zero). For example:

- On input 1 -> 2 -> 8 -> 10 -> 7, and $i=3$ it returns 10.
- On input 11 -> 13 -> 14 -> 13, and index $i=0$ it returns 11.

You may assume $0 \leq i < \text{length of the list}$

See the file `lib/LL.h` for the functions you can use,

```
// the function gets a linked list of ints, and index i  
// and returns the value in the i'th node  
// assumption  $i < \text{length of list}$   
int LL_get(LL_t* list, int i);
```