April 17, 2023

ECE 220: Computer Systems & Programming
Preparation guide for Midterm 2

You can bring exactly TWO A4 sheets with handwritten or printed notes (on both sides).

How to prepare

- this is a (programming) skills based course, so it cannot be learned over several days
- check examples from MPs, lecture notes and labs

Types of problems to expect

- read a C function, and determine its output for given inputs
- identify bugs in a given C function or code
- write a short C function to accomplish a given task
- understand how to use pointers, pointers to pointers, and recursive functions
- understand how to create and use arrays, strings, and linked lists in C language
- know well the basic syntax and constructs of C language (loops, conditional if and switch statements, operators, printf and scanf, static and const variables, typedef, enum, dynamic resizing with malloc/calloc/realloc/free)
- no more LC3 on this midterm

Pointers

- declaring and dereferencing pointers
- pointers to pointers
- NULL and void* pointers
- using pointers as function arguments
- pointer arithmetic

Arrays

- declaration of arrays of different types
- array as a pointer, array pointer arithmetic, indexing array elements
- passing array as input argument to a function
- looping over array elements
- linear and binary search of arrays
- arrays of characters (strings), strcpy, fgets
- working with 2D arrays

Error Taxonomy

- identifying semantic and syntax errors
- module boundaries

Recursion

- basic strategy for writing recursive functions (stopping condition, handle one node, handle children)

Structures

- basic syntax, accessing fields with/without pointer to a parent structure
- using typedef to define structures and declare variables
- sizeof function
- passing structures to functions by value and by reference (using a pointer)
- singly and doubly linked-lists, iterating over list nodes, searching the list node with given ID, inserting and deleting list nodes, cyclic lists, sentinel node

Dynamic resizing

- doubling space when running low on allocated memory
- functions from stdlib: malloc, calloc, realloc, free including their return values
- creating and deleting nodes for linked lists using dynamic memory allocation

I/O in C and Unix