CSCI 2500 — Computer Organization
Lab 07 (document version 1.0)

- This lab is due by the end of your lab session on Wednesday, October 19, 2022.
- This lab is to be completed **individually**. Do not share your code with anyone else.
- You **must** show your code and your solutions to a TA or mentor and answer their questions to receive credit for each checkpoint. **If you do not show your code to the lab TA/mentor to get a checkpoint, you will not receive any credit**.
- Labs are available on Tuesdays before your lab session. Plan to start each lab early and ask questions during office hours, on the Discussion Forum on Submitty, and during your lab session.

We're back to our ultra high level C programming. This might possibly be a relief after all of the MIPS we've been doing. This lab is going to involve implementing simulations for logic gates and more complex circuits. You can do this through the Boolean logic operators available in C (e.g., `||`, `&&`, `^`, etc.). Download the `lab07.c` template to get started. This has empty functions for all of the checkpoints and instructions on what to implement. You'll be filling in all of the listed functions.

1. **Checkpoint 1:** For the first checkpoint, you will use C to finish implementing a simulation of logical NOT, logical OR, logical AND, and logical XOR.

   Download the `lab07.c` code, which provides fill-in-the-blank skeletal code for these logical gates, as well as unit test code in `main()`. Fill in the `not_gate()`, `or_gate()`, `and_gate()`, and `xor_gate()` functions. Verify that the truth table outputs are correct.

2. **Checkpoint 2:** For the second checkpoint, continue to add to the `lab07.c` code by implementing the `multiplexer()` function. Make sure that whenever possible you reuse functions that you already implemented. As before, verify that the truth table output is correct.

3. **Checkpoint 3:** For the third checkpoint, continue to add to the `lab07.c` code by implementing the `decoder()` function. Make sure that whenever possible you reuse functions that you already implemented. Also add code to `main()` to comprehensively test your `decoder()` function. As before, verify that the truth table output is correct.