## UNCA CSCI 235

Final Exam Fall 2018
15 October 2018
This is a closed book and closed notes exam. Communication with anyone other than the instructor is not allowed during the exam. Furthermore, calculators, cell phones, and any other electronic or communication devices may not be used during this exam. Anyone needing a break during the exam must leave their exam with the instructor. Cell phones or computers may not be used during breaks.

This exam must be turned in before 6:55 PM.
Name: $\qquad$

## Problem 1 ( 30 points) C expressions

In the left column, there are twenty tricky and not-so tricky C expressions. Write their values in the right column. Express your answers in simple base 10 expressions, such as 235 or -235 . You may assume that all of these numbers are stored in 16-bit two's complement representation, the usual short.

| 0123 |  |
| :---: | :---: |
| 0xab |  |
| $9>3$ |  |
| $9<3$ |  |
| 20 / 5* 11 |  |
| 20 * 5 / 11 |  |
| 25 \& 19 |  |
| 25 \&\& 19 |  |
| 25 19 |  |
| 25 \|| 19 |  |
| 25 ^ 19 |  |
| 25 != 19 |  |
| ~25 |  |
| !-3 |  |
| 235 * (201 ! = 202) |  |

Problem 2 ( 16 points) Decimal to two's complement conversion
Convert the following four signed decimal numbers into six-bit two's complement representation. Some of these numbers may be outside the range of representation for six-bit two's complement numbers. Write "out-ofrange" for those cases.

| -32 | -19 |
| :---: | :---: |
| 32 | 63 |

Problem 3 ( 16 points) Q4. 4 to decimal conversion Convert the following four Q4.4 two's complement numbers (four fixed and four fractional bits) into signed decimal representation.

## 00110010

## 01001001

## 10010010

## 11111111

## Problem 4 ( 12 points) Decimal to Q4.4 conversion

Convert the following three signed decimal numbers into Q4.4 two's complement numbers (four fixed and four fractional bits). If you can't express the number exactly, give the nearest Q 4.4 representation.

## $-2.35$

## 0.4

## 7.5

## Problem 5 (4 points) Tools of the trade

Answer two of the following three questions.
What text editor have we used to write C code in this class?

What program have we used to compile C code in this class? (There are two possible answers.)

What is argc?

## Problem 6 ( 22 points) C Programming

Write a program that reads (use scanf) a bunch of integers from a terminated standard input stream and counts and then prints (use printf) how many of these integers are (a) between 0 and 100 inclusively or (2) less than 0 or greater than 100. Your output must have neatly formatted lines as illustrated below.

Number within range: 1040
Number outside range: 986
The input is totally unformatted and only contains integers. In the following sample input, three numbers are within the range and four are outside the range.


Here's two lines to get you started:
\#include <stdio.h>
int main(int argc, char *argv[]) \{
\}

