UNCA CSCI 235 Final Exam Fall 2018

11 December 2018 – 3:00 pm to 5:30 pm

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.

Name:

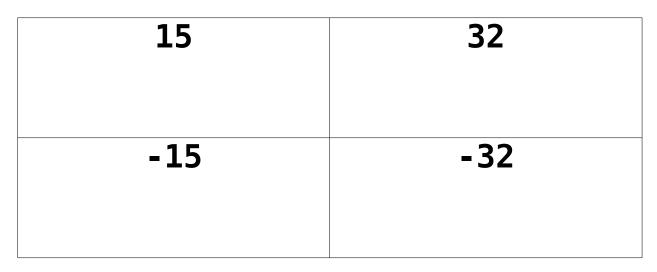
Problem 1 (10 points) C expressions

In the left column, there are fifteen tricky and not-so tricky C expressions. Write their values in the right column. Express your answers as 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	
0xEB	
14 && 14	
42 & 35	
42 >> 3	
42 35	
42 << 3	
42 ^ 35	
~42 + 1	
3 * 4 / 5	
(3 * 4) / 5	
1 < (2 < 3)	
17 & ~17	
17 && -17	
(17 == 17) * 17	

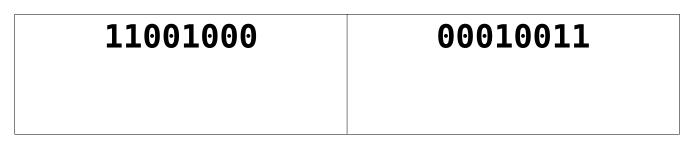
Problem 2 (4 points) Decimal to two's complement conversion

Convert the following four signed decimal numbers into **five**-bit *two's complement* representation. Some of these numbers may be outside the range of representation for **five**-bit two's complement numbers. Write "out-of-range" for those cases.



Problem 3 (3 points) Q4.4 to decimal conversion

Convert the following two Q4.4 *two's complement* numbers (four fixed and four fractional bits) into conventional decimal numbers.



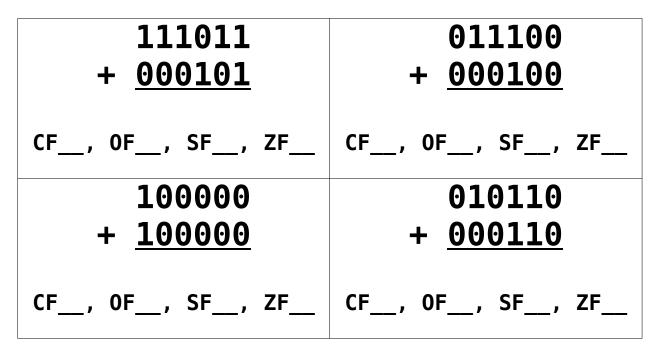
Problem 4 (3 points) Decimal to Q4.4 conversion

Convert the following two 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 Q4.4 representation.

3.3	-1.414

Problem 5 (6 points) Adding numbers with flags

Add the following pairs of six-bit numbers. Based on the result of this addition, set the four x86-64 status bits: CF (carry), OF (overflow), SF (sign) and ZF (zero).



Problem 6 (2 points) Range

What is the range of numbers that can be stored in 16-bit twos-complement numbers? (The short of Java is a 16-bit twos-complement number.)

Problem 7 (2 points) Range

What is the range of numbers that can be stored in 16-bit unsigned numbers? (The char of Java is a 16-bit unsigned number.)

Problem 8 (6 points) Formatted printing

Suppose that the int variable C has the value 170 (in decimal). The left column in the table below has a printf statement. The right column has the desired output for that printf within a six character field. Your task is to fill in the underlined part (the stuff after the %). You must use a single "conversation specifier" (the thing starting with a %) in your format string. No "ordinary characters" are allowed. This means the following are not allowed because they contain ordinary characters.

printf("000160", C) ; // contains only ordinary characters
printf(" %3d", C) ; // starts with three ordinary characters

