You may bring one page of notes, front and back.

Questions will be in short-answer format with partial credit for partial answers.

Questions will require you to read and write C and x86 (IA32) code.

Topics:

- Number formats: decimal, hex, binary
- Integer representations: unsigned, 2s compliment – to/from decimal
- Bitwise operations in C: and, or, not, xor, shifts
- IEEE 754 single-precision floating-point representation: to/from decimal
- Data transfer instructions: movl (and its relationship to C pointers)
- Arithmetic instructions: addl, leal
- Conditional instructions: cmpl, j* instructions
- Labels, with j* instruction in x86, goto statement in C
- Functions: %eip (program counter), %ebp, %esp, return address, call, ret
- Arrays: storage in memory, lookup calculation

Sample questions:

1. (10) What the decimal value of 0xFC, assuming 2s-compliment format? Show your work:

2. (10) What is the hex value of 3.25 encoded as an IEEE 754 single-precision floating-point number? Show your work:

3. (10) Write x86 code which will branch to L1 if and only if the values in %eax and %ebx are equal. Explain your answer:

4. (10) Write x86 code which uses leal instructions to calculate the result of $x = 5\times x + y + 12$ assuming that $x$ is in %eax and $y$ is in %ebx. Explain your answer:

5. (10) Write a C function which takes an unsigned in $x$ as an argument and returns $4\times x$ without using addition or multiplication. Explain your answer: