Winter ’16 CIS 314 Midterm Review

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), pushl, popl
• Arithmetic instructions: addl, subl, 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. (5) 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: