Name: _____ ALGONQUIN COLLEGE **Lab Section:** _____

Objectives: To review important concepts in Chapters 2 and 3. Answer on this sheet where space is given.

References: ECOA2e Section 2.5.3, 2.5.5, 2.5.6, 2.6.3, 2.6.4, 3.2.1-3.2.4 and associated Chapter Slides

Not all questions will be marked – check all your answers against the answer sheet when it is posted.

1. What happens to the value of a binary number if you "shift" the bits to the right one place by deleting the rightmost binary digit, e.g. 1101_2 --> 110_2 _____
2. What happens to the range of values possible in a word if you increase the word length by one bit, e.g. from eight bits to nine bits or from 100 bits to 101 bits? _____
3. In the simplified floating-point model used in the text, the significand can only store eight bits of precision. Why can't the decimal value 128.5 be accurately represented in eight bits? (Section 2.5.3)
   _____
4. IEEE 754 single-precision floating-point can store numbers in the approximate range of 2^{-127} to 2^{+127}. Look up or use a calculator to express this range (approximately) as powers of ten (decimal).
   _____
5. What is the approximate decimal range (powers of ten) of IEEE 754 double-precision floating-point numbers (Figure 2.3, p.70)? _____
6. What is floating-point **overflow**? (p.70, Chapter 2 Slide 81) _____
   _____
7. What is floating-point **underflow**? (p.70, Chapter 2 Slide 81) _____
   _____
8. What serious mathematical error can occur due to floating-point underflow? (Chapter 2 Slide 81)
   _____
9. Give a decimal example of a floating-point number that would cause overflow if you tried to represent it as an IEEE 754 single-precision floating-point number: _____
10. Give an example of a floating-point number that would cause underflow if you tried to represent it as an IEEE 754 single-precision floating-point number: _____
11. Why do the decimal numbers 2147483775 (0x8000007F) and 2147483648 (0x80000000) both convert to the same IEEE 754 single-precision floating-point number 0x4F000000 that has decimal value 2147483648.0? (Hint: For a similar reason, in Section 2.5.3, the numbers 128 and 128.5 both convert to 128.0 when stored in the simplified floating-point format used in the text.) _____
    _____
    _____

12. True / False – floating point mathematics may not be associative or distributive. (Section 2.5.6)
13. What is the correct way to test that floating-point value **x** is "equal" to zero? (p.72)

    _____
14. Give the range of unprintable ASCII "Control" characters in decimal and hexadecimal. (Section 2.6.3)

    _____
15. How many bits are needed to represent the unprintable ASCII "Control" characters? _____
16. What is the name of the first printable character in the ASCII character set? _____
17. The ASCII code for **Z** is decimal 90 (0x5A). Derive the code for **CTRL-Z** in decimal and hex.

    _____
18. If the ASCII code for **Z** is decimal 90 (0x5A), what is the code for **Y** in decimal and hex? _____
19. What ASCII value do you get if you subtract the code for **Space** from the code for lower-case **m**? (see Table 2.7 p.79) _____
20. Does the above subtraction transform work for all the lower-case ASCII letters? _____
21. Represent the seven-bit ASCII character **Z** in eight bits using odd parity. (Section 2.6.3) _____
22. Represent the seven-bit ASCII control character **CTRL-Z** in eight bits using odd parity. _____
23. You look into memory and you see the value 0x5A5A. How can you tell if this is two ASCII letters or a numeric data value? _____
24. How many bytes does it take to store a Unicode character? (Section 2.6.4) _____
25. True / False – the first 128 characters of Unicode (0x0000 to 0x007F) are the same as ASCII. (p.80)
26. True / False – the Elvish script used in Tolkein's *The Lord of the Rings* (**Tengwar**) is a proposed character set included in the Unicode standard. (http://www.unicode.org/roadmaps/smp/)
27. Construct a Boolean truth table for **xyz + (xyz)'** [where the prime mark indicates complement]. (p.155)
28. Construct a Boolean truth table for **x(yz'+x'y)** [where the prime mark indicates complement]. (p.155)
29. Give both versions of deMorgan's Law (p.113): _____
30. Using deMorgan's Law, write an expression for the Boolean complement of **x(y'+z)**. (p.155 and Section 3.2.2-3.2.4) _____
31. Using deMorgan's Law, write an expression for the Boolean complement of **xy+x'z+yz'**. (Section 3.2.2-3.2.4) _____
32. Avoiding a Common Error: Use a truth table to show that **(xy)'** is not equal to **x'y'** and **(x+y)'** is not equal to **x'+y'**. (i.e. "not red Jello" is much more specific than "not red and not Jello".) (bottom p.113)