Test 1 Review

Coverage: Lectures 1-5, Labs 1-4, all examples we discussed in class, all handouts posted in the lecture page of the class website.

Material you should bring: Text books, Freescale manuals, Lecture notes, Example handout, Lab handout.

Format: consists of conceptual problems and work problems (e.g. fill the blank, track control & data flows in program, assembly programming).

Restrictions: open book and notes. NO calculator and laptop is permitted (no exception).

Topics:

1. Binary representation of unsigned-/signed- number
2. 2’s complement arithmetic and overflow detection
3. Microprocessor architecture, instruction format (opcode, operand), instruction length and memory layout (byte order)
4. HC12 programming models (available registers, purpose of each bit in CCR)
5. HC12 addressing modes
   - Inherent
   - Immediate
   - Direct/Extended
   - Indexed
     - Indexed using constant offset
     - Indexed with automatic inc. and dec.
     - Indexed with accumulator offset
   - Indexed-Indirect Addressing
   - Relative
6. Basic assembly programming
   - Pseudo-ops (ORG, EQU, DS, DC.B, DC.W)
7. Stack
   - Initialization and basic operation (PSH_, PUL_)
   - How the stack is operated upon on to subroutines call and return
   - How to use stack to pass parameters to/from subroutine
   - Stack operation using PSH_, PUL_ vs. LEAS
8. Structured assembly programming
   - Use flow chart or pseudo-code for program design
   - IF-then-else
   - Do-while
• While-do
• Loop

9. HC12 instruction set

• Typical scenarios of using a given instruction (e.g. initialization of memory location, fast multiply and divide by \(2^n\), detect the status of a I/O port, set/reset certain bit in register)
• Inter-changeable implementations (e.g. TRF B, D ⇔ SEX B, D; INS ⇔ LEAS 1, SP; CLC ⇔ ANDCC #00000000; LDAA 0, X, INX ⇔ LDAA 1, X+)

10. Assembly coding, bug finding (e.g. logical error)/fix, and code optimization

11. Hand assembling and disassembling, execution time calculation

12. All hardware and software work that you have done during Lab 1 – Lab 4