Review of CMPE12C

Spring 2003
Practice Final Exam

Simply print out all the homework solutions and the Midterm solutions and do problems again and check if you did them correctly. Do again and again.
What we covered

• MAL
• Number Systems (Roman, Binary, Hexadecimal, Octal, Decimal)
• Data Representation (Biased Numbers, 1’s & 2’s Compliment, Sign Magnitude, ASCII, Floating Point)
• Arithmetic and Logical Operations (not, nor, nand, xor,…, shifting, rotating, addition, subtraction, multiplication)
• Floating Point Arithmetic (adding, subtracting, multiplying)
• Data Structures (memories, arrays (1D and 2D), queues, stacks)
• Procedures (JAL and JR, system stack usage)
• The Assembly Process (linking and loading, machine code, TAL)
• I/O and interrupts
• HC11 Assembly and Microcontrollers
• Architecture (Pipelining, Memory Hierarchy)
How to convert between radixes

Given the binary number 1011, what is the Decimal, Hex, and Octal equivalents?

What is –23 in 1’s and 2’s Compliment? How about SM?
Floating Point
Addition/Multiplication

Addition: What you do is very simple.
1) Break up into 3 parts (S,E,F)
2) Make the smaller exponent the same as the bigger one.
3) Adjust the fraction accordingly (be sure to put the hidden bit in).
4) Add the fractional parts together.
5) Renormalize the fraction and adjust the exponent as needed.
6) Put back together into one 32-bit word the 3 parts, S, E, and F.

Multiplication: What you do is so simple.
1) Break up into 3 parts (S,E,F).
2) Add exponents together and take out 127 to keep as biased 127
3) Multiply the 2 fractions (be sure to put the hidden bit back)
4) Renormalize the fraction and adjust the exponent as needed.
5) Put back together into one 32-bit word the 3 parts, S, E, and F.
Arithmetic Operations

Do you know how to do binary addition and subtraction?

What is the difference between a logical and arithmetic shift?

Remember how to do 2’s compliment addition? Subtraction?

What about all the logical operations? (NOT, NOR, NAND…?)
Data Structures

How do you make an array in MAL (1D and 2D)?

What is a queue? How about a stack? How do you implement one in MAL?
Procedures

So what is a procedure? What does it mean to “jump to it” and “jump out of it”?

What is the system stack? How do we use it? What do we use it for?
Assembly Process

What is the assembly process?

What is Machine Code? What are the format of the instructions?
IO and Interrupts

What is IO? How do we “talk” to it as a programmer?

What are interrupts? Why use them? What are some alternatives?
Microcontrollers

What are microcontrollers? What are they used in and why?

What are some of the differences between the HC11 and MAL assembly?
Architecture

What is pipelining? Why would you want to use it?

What is a memory hierarchy? Why have one?

What is “virtual memory”? Why use it?