**EE3376 – Embedded Systems - Spring 2008 - Exam 1 – MacDonald – Page 1**

**Student Name:_____ Student ID: _____**

Show work with intermediate steps. Showing only the answer will get no credit.
Indicate theorems used in factoring and simplification.

**Problem 1**

a – Fill in the table with the values after the execution of the instruction ***cmpa 2,X.***

| | Initial | Final |
|---|---|---|
| Accumulator A | $01 | |
| Accumulator B | $20 | |
| Accumulator X | $1000 | |
| Accumulator D | | |
| Accumulator Y | $2000 | |
| Stack Pointer | 3C00 | |
| Bit C of CCR | 0 | |
| Bit V of CCR | 0 | |
| Bit N of CCR | 0 | |
| Bit Z of CCR | 0 | |
| Memory $1000 | $00 | |
| Memory $1001 | $01 | |
| Memory $1002 | $02 | |
| Memory $1003 | $03 | |
| Memory $2000 | $04 | |

b – If followed immediately by *BNE*, would the branch be taken?

b – If followed immediately by *BGT*, would the branch be taken?

b – If followed immediately by *BLE*, would the branch be taken?

**Student Name:**_____ **Student ID:** _____

**Problem 2 –**

a) Provide the machine code (hand assemble) the instruction: **movw #$1000, $2000** (15pts**)**

| Address | Contents |
|---|---|
| **$0C00** | |
| **$0C01** | |
| **$0C02** | |
| **$0C03** | |
| **$0C04** | |
| **$0C05** | |

b) Given the contents of eeprom below and assuming the contents are instructions, create (hand dis-assemble) the corresponding assembly program (15pts).

| Address | Contents |
|---|---|
| **$0C00** | **$F4** |
| **$0C01** | **$18** |
| **$0C02** | **$18** |
| **$0C03** | **$CE** |
| **$0C04** | **$30** |
| **$0C05** | **$00** |

**Student Name:**_____ **Student ID:** _____

**Problem 3 –**
**You have three choices for problem 3. Circle the option you intend to solve.**

**A)** Write a subroutine called *div3* that divides the unsigned integer in register A by 3 and disregards the remainder – returning the answer in register A. **Full credit plus a 5 point bonus if correct.**

**B)** Write a subroutine called *negd* that negates the signed contents of register D – returning the results in register D (i.e. –5 becomes 5, 6 becomes -6, etc). **Full credit with no bonus.**

**C)** Write a subroutine called *mul16* that multiplies the signed contents of register B by 16 and returns the answer in register B. You may ignore possibility of overflow. **Partial credit only (Full – 10 points).**

Notes:
Fail to write a real subroutine = -10
Invent an instruction or addressing mode = 0 credit
Option A can be done in 7 instructions, options B and C can be done in 5.