EE3376 – Embedded Systems - Spring 2006 - Exam 1 – MacDonald – Page 1

Student Name:_____ Student ID: _____

Show work with intermediate steps. Showing only the answer will get no credit.

Problem 1 – 30 points
Assume "***movw 2,X+ 2,+Y"*** is the next instruction in line and is executed with the initial values shown in the table below.

a – Fill in all blank entries in the table before and after the execution of the instruction.

	Initial Value (before execution)	Final Value (After execution)
Accumulator A	$00	
Accumulator B	$04	
Accumulator D		
Accumulator X	$1000	
Accumulator Y	$1002	
Bit N of CCR	0	
Bit Z of CCR	0	
Bit C of CCR	0	
Bit V of CCR	0	
Memory $1000	$80	
Memory $1001	$00	
Memory $1002	$FF	
Memory $1003	$FE	
Memory $1004	$FC	
Memory $1005	$FE	
Memory $1006	$FD	

b – Can the CCR bits be interpreted after this instruction and if so how?

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Problem 2 30 points –

a) Provide the machine code (hand assemble) the instruction **movw #$1000 $1000** followed by an **aba** instruction (15pts**)** by filling out the table below. Assume the instruction starts at location $1000. (Note: not all locations below may be necessary in which case leave them blank).

Address	Contents
$1000	
$1001	
$1002	
$1003	
$1004	
$1005	
$1006	
$1007	
$1008	

b) Given the contents of eeprom below and assuming the contents are instructions, create (hand dis-assemble) the corresponding assembly program (15pts).
Hint: more than one instruction is encoded below. Boundaries are important. The instructions are contrived so don't look for them to do something reasonable.

Address	Contents
$0C00	**$79**
$0C01	**$10**
$0C02	**$00**
$0C03	**$03**
$0C04	**$02**

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Problem 3– 40 points
The following subroutine performs a conversion on an ASCII string stored in memory at a location starting with the address pointed to by the X index register. The string length is always 3.

```
; calling sequence
; ldx #$1000
; jsr ascii_convert

ascii_convert:  psha
                pshb
                clra
loop            ldab   A,X
                subb   #$20
                stab   A,X
                inca
                cmpa   #3
                bne    loop
                pulb
                pula
                rts
```

	Initial value	After the first execution of inca	After rts
Register A	$FE		
Register B	$FF		
Register D			
Register X	$1000		
Register Y	$3000		
Memory $1000	$70		
Memory $1001	$6F		
Memory $1002	$70		
Memory $1003	$7A		
Memory $1004	$78		
Memory $3000	$79		

a. Fill in all blank entries in the table above including initial for the D register.

b. 2 point bonus – what is the conversion that is being done- assuming the ascii values are all between $61 and $7A.