

EE371 Second Semester Test - Thursday October 21, 2004
45 points, 16.67% of Final Grade

Please put your name on the outside of the paper also. Name _____ KEY _____

1. Assume K1 and K2 are 8-bit signed (two's-complement) integer variables and K3 is a 16-bit unsigned integer variable.
 - a. Show how to allocate storage for these variables in an (**relocatable**) assembly language program using the CodeWarrior assembler. (4 points)

SECTION

K1: DS.B 1
K2: DS.B 1
K3: DS.B 2 or DS.W 1

- b. Write structured assembly language code for the following design (assume K1, K2 and K3 have some been initialized in some other part of the program.): (8 points)

```
; IF K1 < K2
    ldaa    K1
    cmpa    K2
    bge     else
; THEN
    ; Set K1 to the most positive number.
    movb    #127,K1
    or
    ldaa    #127
    staa    K1

    bra     endif
; ELSE
else:
    ; Set K3 to the most positive number
    movw    #$fff,K3
    or
    ldd     #$fff
    std     K3
    ; Initialize K2 to the most negative number
    movb    #-$80,K2
    or
    ldaa    #-$80
    staa    K2
; ENDIF
endif:
```

2. In the CodeWarrior assembler, describe the difference between DC.B and DS.B. (2 points)
DC.B defines a byte constants and allocates (initializes) it in memory.
DS.B allocates a byte storage location without initialization.

3. Assume accumulator A has \$33, the contents of memory location DATA = \$83 and the instruction CMPA DATA is executed. Fill in the following answering Yes or No whether or not the conditional branch instruction is taken. (5 points)

	BGE	BLE	BGT	BLT	BEQ	BNE
Yes or No ->	YES	NO	YES	NO	NO	YES
	BHS	BLS	BHI	BLO		
Yes or No ->	NO	YES	NO	YES		

4. List 5 principles of top down design. (5 points)

Understand the problem

Design in levels

Ensure correctness at each level

Postpone details

Successively refine

Language independence

5. The registers in the HC12 show the following:

D = \$2245, X = \$1234, Y = 5678, SP = \$0900

Assume the following sequence of code is executed and then specify what is in the stack and what is in the registers:

```
psha
pshx
aba
psha
puly
```

Register Contents after the program sequence is executed: (5 points)

A = \$67 B = \$45 X = \$1234 Y = \$6712 SP = \$08FE

Contents of the stack after the program sequence is executed (give your answer in hexadecimal): (5 points)

Memory Address	Memory Content (hex)
08FA	
08FB	
08FC	\$67
08FD	\$12
08FE	\$34
08FF	\$22
0900	
0901	
0902	
0903	
0904	
0905	

6. Write a pseudo-code design for the following program statement: (10 points)

The program is to prompt for and accept a two-digit hexadecimal number from a user using getchar. If the two digits entered by the user signify a printable ASCII character, the character is to be printed with an appropriate message. Otherwise, an error message is to be printed. The program is to continue until the user types two hex numbers which are not a code for a printable character. Your design must show at least one example of a repetition and one decision.

(Example: If the user types a 4 and then a 1, A should be printed along with an appropriate message.)

```
; DO  
; Prompt the user for a 2 digit hex number  
; Get 2 digit hex number  
; Convert from ASCII hex to binary  
; IF the number is printable  
; THEN  
; Print "The hex code is the character "  
; Print the character  
; ELSE  
; Print "The hex code is not printable."  
; ENDIF the number is printable  
; ENDO  
; WHILE the number is printable
```

7. Who is buried in Grant's tomb? (1 point) Grant