

EE371 First Semester Test - Thursday September 30, 2004  
40 Points, 16.667% of Final Grade

Please put your name on the outside of the paper also. Name: \_\_\_\_\_KEY\_\_\_\_\_

Hand in the test folded so your name shows on the outside.

1. Discuss the difference between an absolute and a relocatable assembler. (4 points)

**Absolute: ROM and RAM must be located at assembly time with ORG; all code must be in one file;**

**Relocatable: Locating is done at link time; ROM and RAM are designated by SECTIONS; code can be modular**

2. Using the relocatable assembler, how do you define a constant byte? (2 points)  
**DC.B expression (or CONST EQU expression)**
3. Using the relocatable, how do you allocate storage for ten (decimal) bytes? (2 points)  
**DS.B 10**

4. Describe what each of the following operations do: (8 points)

**ORAB Performs the bitwise OR of the contents of the B register with the contents of the specified memory location and places the results in the B register. The condition code register bits N,Z, V are modified and the C bit is unchanged.**

**RORA Rotate all bits in the A register to the right with B7 being replaced by the carry bit and the carry bit replaced by B0. All condition code register bits are modified.**

**ADCB Add the contents of the specified memory location plus the carry bit to the contents of the B register and place the result in the B register. All condition code register bits a modified.**

**STY Store the contents of the Y index register in the specified memory location. N and Z are modified, V is reset to 0 and C is unchanged.**

5. For each of the following instructions, give the effective address: (4 points)  
Assume X = \$1000, Y = \$6000 for each instruction.

LDA 0,X      EA = \$1000

ORA \$1000    EA = \$1000

STA \$26      EA = \$0026

ANDA \$26,Y   EA = \$6026

6. Assume you single step through the following program using CodeWarrior. At each of the program steps fill in the blank boxes with the expected contents of the A, B, D, X and Y registers. Give your values in hexadecimal (15 points)

P	EQU	\$1000					
R	EQU	\$6000					
S	EQU	\$8000					
C	EQU	4					
	ORG	P	A	B	D	X	Y
	LDS	#S					
	LDY	#CONST					\$6000
	LDX	CONST				\$1011	\$6000
	LDAA	0,Y	\$10				
	PSHA		\$10				
	PULB		\$10	\$10	\$1010		
	LDAB	#C	\$10	\$04	\$1004		
	LDAA	B,Y	\$11	\$04	\$1104		
	COMA		\$EE				
	HCF*						
	ORG	R					
CONST: ORG \$10,\$11,25,'A',%00010001							

7. What conditional branch instruction would you use in each of the following program scenarios: (5 points)
- Branch to a part of the program if a 2's complement overflow occurred?  
**BVS, LBVS**
  - Branch to a part of the program if an unsigned binary overflow occurred?  
**BCS, LBCS**
  - Branch to a part of the program if an 8-bit unsigned binary number input from the switches is less than one-half the maximum value.  
**BLO, LBLO**
  - Branch back to the start of a loop a number of times based on a counter in a register.  
**BNE, LBNE**
  - Unconditionally branch to a part of the program.  
**BRA, LBRA, JMP, etc**

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\* HCF is a special EE371 op code that means "Halt and Catch Fire".