

FIRST EXAM
ECEN 2120 - Lecture 1
October 1, 2003

This exam is closed book, closed notes and no calculators.

Complete the portion of the bubble sheet with your student ID number and your name. In the "1 2 3 4" columns, put a "0" in column 1 and your lab section number in columns 2, 3 and 4.

If you want your grades included in a list of posted grades, please include a 6 alpha-numeric code in the space provided on the scan sheet. Print this code clearly. No obscene character sequence will be accepted. You must also sign your name in the space provided.

Use a number 2 pencil to clearly select your answer. If you need more space to work a problem, use the back of an exam page. You have 50 minutes. **Good Luck!**

Questions 1 - 3. For the first 3 questions, use the register values given in the table below. All the values in the table and the answers are in hex (assume any leading digits are zero).

D0 CA48	D1 0012	D2 DA10	D3 0348	PC AC13
A0 0040	A1 0200	A2 2130	A6 4050	A7 3334

Question 1. (3 points) For the instruction: CLR.L -(A1) what is the effective address of the operand?

- (a) 0196 (b) 0199 (c) 01FC (d) 01FF (e) 0200

Question 2. (5 points) For the instruction: CLR.B \$89(PC,D1) what is the effective address of the operand?

- (a) ABAE (b) AC14 (c) ACAE (d) AD14 (e) None of these

Question 3. (2 points) For the instruction: JSR (A2) what is the target address?

- (a) 2130 (b) CD43 (c) None of these

Question 4. (3 points) For the instruction: CLR.L (SP)+ what addressing mode is being used?

- (a) Address register direct
(b) Address register indirect
(c) Address register indirect with postincrement
(d) Address register indirect with predecrement
(e) None of the above

Question 5. (3 points) For the instruction: CLR.W \$567(A0) what addressing mode is being used?

- (a) Address register direct
- (b) Address register indirect
- (c) Address register indirect with displacement
- (d) Address register indirect with index
- (e) None of the above

Question 6. (3 points) For the instruction: CLR.B D0 what addressing mode is being used?

- (a) Data register direct
- (b) Address register direct
- (c) Address register indirect
- (d) Absolute Short
- (e) None of the above

Question 7. (3 points) The assembler directive DS.W \$10

- (a) reserves 10 words in memory.
- (b) reserves 32 bytes in memory.
- (c) defines a constant to be \$10.
- (d) defines a block of 10 words filled with zeroes.
- (e) None of the above

Question 8. (3 points) Which instruction initializes the 32-bit value in D1 to 5?

- (a) MOVE.W 5,D1
- (b) MOVE.L 5,D1
- (c) MOVE.W #5,D1
- (d) MOVE.L #5,D1
- (e) None of the above

Question 9. (5 points) The hexadecimal value B5 is an 8-bit 2's complement number. What is its decimal interpretation?

- (a) 181
- (b) -53
- (c) -74
- (d) -75
- (e) None of these

Questions 10 - 14. Consider the following C function:

```
int DummyProcedure(char *A, int B, short C); {  
    int i, j, k;  
    ... function body ...  
}
```

Assume that the C compiler generates assembly code for this function using the standard conventions and linkage. Furthermore, assume that registers D0-D5 and A0-A3 are used in the body of the function.

Question 10. (5 points) Which of the following assembly code would load D0 with the value of the variable C?

- (a) MOVE.L 12(a6),D0 (c) MOVE.W 16(a6),D0 (e) None of these
(b) MOVE.W 14(a6),D0 (d) MOVE.L 16(a6),D0

Question 11. (5 points) Within a sequence of code that loads D1 with the first character of A, which of the following lines of assembly code might you expect to see?

- (a) MOVE.B 8(a6),D1 (c) MOVE.L 8(a6),D1 (e) None of these
(b) MOVEA.L 8(a6),A1 (d) MOVEA.B 8(a6),A1

Question 12. (3 points) Just before returning to the calling procedure, which of the following lines of assembly code would you expect to execute?

- (a) MOVEM.L -24(a6),D2/D3/D4/D5/A2/A3
(b) MOVEM.L -40(a6),D0/D1/D2/D3/D4/D5/A0/A1/A2/A3
(c) MOVEM.L D2/D3/D4/D5/A2/A3,-(SP)
(d) MOVEM.L D0/D1/D2/D3/D4/D5/A0/A1/A2/A3,-(SP)
(e) None of these

Question 13. (3 points) Assume that DummyProcedure was called by a C procedure. Immediately after the return from DummyProcedure to the calling procedure, the assembly language version of the calling procedure should typically execute an instruction. Which of the following might you expect?

- (a) ADDQ.L #12,SP (c) ADDI.L #12,SP (e) None of these
(b) ADDI.L #7,(SP) (d) ADDQ.L #3,SP

Question 14. (3 points) Since DummyProcedure is a function, it returns a value to the calling procedure. Where is this value returned?

- (a) In D0 (b) In D1 (c) In D0 and D1 (d) On the stack (e) None of these

Question 15. (5 points) When writing assembly code subroutines that call, or might be called by code generated by the C compiler, which of the following statements is FALSE?

- (a) A6 is reserved for use as a Frame Pointer.
- (b) The callee saves non-volatile registers.
- (c) Arguments are pushed as long words.
- (d) Local variables are always allocated on the stack.
- (e) The Frame Pointer can be used to reset the Stack Pointer.

Questions 16 - 19. Assume that D0 initially contains the hex value 00008E64. Also assume the following segment definition:

```
SECTION vars,,D
B DC.W $D817
END
```

Question 16. (5 points) The instruction **ADD.W B,D0** is executed. After the add instruction is executed, what is the value in D0 (in hex)?

- (a) 1667B (b) 16681 (c) 667B (d) 6681 (e) None of these

Question 17. (3 points) What is the value of the C bit in SR after the instruction is executed?

- (a) 0 (b) 1 (c) Not enough information

Question 18. (3 points) What is the value of the N bit in SR after the instruction is executed?

- (a) 0 (b) 1 (c) Not enough information

Question 19. (3 points) Would you expect the V bit of SR to be set after the instruction is executed?

- (a) Yes (b) No (c) Not enough information

Questions 20 - 27. For the remaining questions, use the code given on page 6 of the exam.

Question 20. (5 points) What 32-bit value is in D0 after the instruction at Line C is executed?

- (a) 13 (b) 9 (c) 5 (d) \$00104A5B (e) None of these

Question 21. (5 points) What 32-bit value is in D0 after the instruction at Line H is executed?

- (a) \$0000DB5F (b) \$00000052 (c) \$FFFFDB5F (d) \$FFFF0A5F (e) None of these

Question 22. (5 points) What value is in D1 after the instruction at Line M is executed?

- (a) 'S' (b) 'e' (c) \$00104A80 (d) \$00104A81 (e) None of these

Question 23. (5 points) What is the machine language encoding of the instruction at Line M? The answers are in hex. (See the last page of the exam for some useful information.)

- (a) 2218 (b) 1218 (c) 1058 (d) 1041 (e) None of these

Question 24. (3 points) Which directive would you use to make the procedure MyProc available to code in another .obj file?

- (a) EQU (b) XDEF (c) XREF (d) SECT (e) None of these

Questions 25 - 27. For the following questions use the following answers:

- (a) first-pass of a two-pass assembler (d) execution time (run time)
(b) second-pass of a two-pass assembler (e) none of the above
(c) link/load time

Question 25. (3 points) When is the value of the target of the 'jsr' at Line D set?

Question 26. (3 points) When is the value of the target of the 'bra' at Line I set?

Question 27. (3 points) When is the memory address used with the instruction at Line N determined?

The following sequence of assembly code is to be used with questions 20 through 27. A line of '...' indicates several lines of unrelated code.

```

V1      EQU      $0A5F
        XDEF     MyArray, Buff1, Buff2

        SECTION vars,,D
MyArray DC.L     Buff1, Buff2
Buff1   DC.L     9,8,7,6,5,4,3,2,1,0
Buff2   DC.B     'Second message',10,0

        SECTION code,,C
MyProc:
...
L1:     move.l   #Buff1,A1      ; Line A
        addq.l   #4,A1         ; Line B
        move.l   (A1),D0       ; Line C
        jsr     dosomething    ; Line D
        ...
        clr.l   D0             ; Line E
        move.w  #$D152,D0      ; Line F
        ext.l   D0             ; Line G
        or.w   #V1,D0         ; Line H
        bra    L1             ; Line I
        ...
        clr.l   D1             ; Line J
        move.l  #%0110,D2      ; Line K
        move.l  MyArray+4,A0   ; Line L
Next:   move.b  (A0)+,D1       ; Line M
        move.b  D1,-(A2)      ; Line N
        subq.l  #1,D2         ; Line O
        bne    Next          ; Line P
Done:   ...

        XREF     dosomething
        end

```

Partial Linker Symbol Table

_outchar	\$00104788	Buff1	\$00104A58
dosomething	\$001047D6	Buff2	\$00104A80
MyArray	\$00104A50		

Some useful information.