DAT2343 - MidTerm Test A	L
Fall 2009 - Prof. Ian Allen	

Name:	
Maximum Time: 110 minutes	Total Marks: 81

> Put final answers **on this question sheet**, where **underlined** space is given.

- Enter the **long answers** and **rough work** in the **examination booklet**(s).
- The use of calculators, notes, or other external aids are *not* permitted on this test.
- You must hand-in these question sheets with your completed test booklet(s).

1.	Convert the following	decimal values into	16-bit word, 2's C	Complement e	ncoded values	in hexad	ecimal
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(3)

2. Perform the indicated 12-bit hexadecimal arithmetic. Show the result value and indicate by check marks the correct "ON" states of the **Z**ero, **C**arry, **S**ign, and **O**verflow flags after the arithmetic:

(8)

3. Perform the following 32-bit hex bitwise operation:

4. Encode as hexadecimal bytes the following two lines using standard MS-DOS ASCII file encoding:

Aa Bb Cc 43 21

(4)

= ______

5. How many different bit patterns are possible for 15 bits? = _____ patterns

(1)

6. If the last two steps of the LMC Instruction Cycle were done in reverse order, which instructions would behave differently?

(2) =

7. Name all the LMC executable instructions that are *not* relocatable. (A list of LMC executable instructions and pseudo-instructions is on the last page of this test.)

(4)	=
8.	What is the major difference in function between a JUMP instruction and a CALL instruction?
(1)	=
9. (1)	What is the minimum number of binary bits needed to represent 32,793 items? =
10. (1)	The IEEE 754 32-bit single-precision floating-point number DEADBEEFh is negative. Give the hexadecimal for the same value, only positive: = hex
11. (6)	In your exam book, name and describe briefly the three steps in the Computer Instruction Cycle.
	The next few questions apply to the following DEBUG dump from a mainframe computer:
	0000:0390 B8 37 1E BA 30 08 3B C4-73 6A 8B C4 2D 45 03 90 .70; sjE 0000:03A0 25 F0 01 8B F8 B9 A2 07-90 BE 7E 39 FF F0 46 8B %~9F. 0000:03B0 D8 B1 04 D3 EB 8C D9 03-00 53 33 DB 53 F8 FF 01S3.S 0000:03C0 50 4B 4C 49 54 45 20 43-6F 70 34 2E 20 31 39 38 PKLITE Cop4. 198 0000:03D0 32 20 50 4B 57 41 52 45-20 49 6E 63 2E 20 42 6C 2 PKWARE Inc. B1 0000:03E0 6C 20 52 69 67 68 74 73-20 52 65 73 65 72 76 65 1 Rights Reserve 0000:03F0 64 4E 6F 74 20 65 6E 6F-75 67 68 20 6D 6F dNot enough memo
(1)	What is the hexadecimal value of the byte at address O3DE ? = hex
13. (1)	What is the hex address of the first byte containing an ASCII letter " \mathbf{F} " = hex
14.	Give the address in decimal of the last (ending) byte of this dump screen: = decimal
	Decode to decimal the two-byte 2's complement integer at address 03AC = decimal (Note: This dump is from a mainframe computer, not an Intel computer.)
(2)	

16. Relocate the following subroutine to load at mailbox **20**. Write the new code on the lines provided:

Loc Code Label	Mnem Operand	New Loc - New Code - Reason for change
00 000 RETRN	DAT ?	
01 206 DOUBLE	STO VAR	
02 306	ADD VAR	
03 801	SKZ	
04 600	OUT	
05 900	JMP RETRN	-
06 206 VAR	DAT 206	

(7)

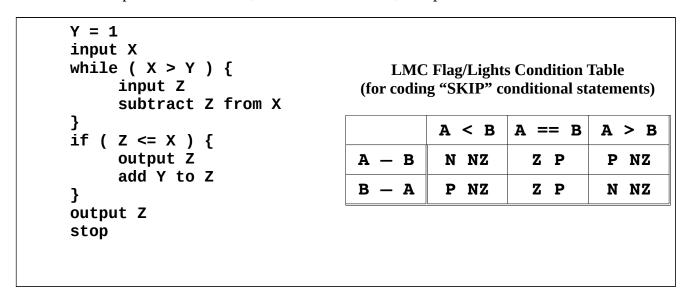
Answer all the following questions by number in the examination booklet.

The "Little Man Computer" (LMC) uses the following Operation Code Mnemonic table:

0ху	1xy	2xy	Зху	4xy	500	600	700	800	801	802	803	9ху	(pseudo)	(pseudo)
CALL	LDA	ST0	ADD	SUB	IN	OUT	HLT	SKN	SKZ	SKP	SKNZ	JMP	DAT	ORG

Answer all the following questions by number in the examination booklet.

- 17. Translate the following machine level code for the LMC into labels, assembler mnemonic codes, and operands. Use the standard 5/6-column format used in class: *Location, Code, Labels, Mnemonics, Arguments/Operands, Comments.* Assume the code is loaded into mailboxes starting at mailbox **00**. Distinguish between Instructions and Data. (*Remember: Put your answers in the answer booklet.*)
- (6) 500 311 800 410 600 500 800 310 600 700 500 600
- 18. For the code provided in the preceding question, given input values of **555** then **111**, what value(s) (if any) would be output by this LMC program? (*Remember: Put your answers in the answer booklet.*)(4)
- 19. Translate the following pseudo code into standard 5/6-column LMC assembler mnemonic form (using labels) *without optimizing*. Translate the LMC mnemonics to LMC machine codes (numbers) assuming the code is to be loaded by a linker to start at mailbox **00**. Use the standard 5/6-column assembler format with labels for operands. Use labels, not mailbox numbers, for operands.



Your final answer should have the standard 5/6-column format used in class:

Location, Code, Labels, Mnemonics, Arguments/Operands, Comments.

Do not optimize your code; do a direct, statement-by-statement translation to LMC assembler.

(10)

All answers on this page should be written in your answer booklet. Number your answers.