

EEAP 282

EXAM #2

NAME: _____

CWRUnet ID: _____

IMPORTANT INFORMATION:

1. All questions are worth TEN (10) points apiece.
2. Exam is closed book, closed notes. Only the M68000 Programmer's Reference Manual and/or Programming Reference Card are allowed to be used.

Problem	Score
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
TOTAL SCORE	

Notation used: \$ indicates hex, % indicates binary

NOTE: If you come to an address calculation that is outside the data given for any problem, BE SURE TO SHOW HOW YOU DID YOUR CALCULATIONS.

BIT MANIPULATION INSTRUCTIONS:

1. For this problem you are given that

(\$25EFE)=\$0B	(\$2FFFE)=\$60
(\$25EFF)=\$EA	(\$2FFFF)=\$A0
(\$25F00)=\$FF	(\$30000)=\$0E
(\$25F01)=\$40	(\$30001)=\$F0
(\$25F02)=\$AF	(\$30002)=\$EE
(\$25F03)=\$8F	(\$30003)=\$34
(\$25F04)=\$10	(\$30004)=\$78

and

SR=\$0500

If (D1) = \$00000005 and (D2) = \$0002FFFE, what is the result of executing the instruction BCHG D1,D2? Be sure to indicate any changes to the Status Register.

BRANCHING INSTRUCTIONS:

2. For the following program segment:

```
      CLR.L      D1
      MOVE.L     #10,D0
LOOP2: ADD.L     D0,D1
      SUBQ      #1,D0
      BPL      LOOP2
      <next instruction>
```

SUBQ gets executed _____ times

(D1) = _____ after the program stops.

3. What are the values of the N, Z, V and C flags after each of the following instructions is executed **independently**. Assume the flags are all zero and the register contents are as shown immediately prior to executing each instruction register contents:

(D0) = \$FFFFFFFF
 (D1) = \$00001000
 (A0) = \$00010010
 (A1) = \$00010020
 (A3) = \$00010030

memory contents:

(\$10000.W) = \$1234
 (\$10010.W) = \$31D0
 (\$10020.W) = \$0D0A
 (\$10030.W) = \$1234

Instruction:	X	N	C	V	Z
before each instruction	0	0	0	0	0
CMP.B \$10000,D0					
CMPA.W D1,A0					
CMPI.W #\$1234,(A0)					
CMPM.B (A1)+,(A3)+					

ADDRESSING:

4. Given that

(\$4500) = \$12345678,
 (\$4508) = \$82344234,
 (A0) = \$00004500
 (D0) = \$FFFFFF88

what will be the contents of A0, D0 and the status bits after the execution of

ADD.B (A0)+,D0

(A0) = _____ (D0) = _____
 N = _____ Z = _____ V = _____ C = _____

5. For this problem assume that

(A1) = \$ 00005500,
 (A2) = \$ 00005502,
 (D1) = \$ FFFF0000, <---should be \$0000FFFF
 (D2) = \$ 00000000

and

(\$5500) = \$ 10000A04 Note all long words
 (\$5504) = \$ 00008002 <---should be \$00005502
 (\$5508) = \$ 10023013
 (\$550C) = \$ B0214A31
 (\$5510) = \$ C1D11122 <---should be \$02CD3256
 (\$5514) = \$C1D11122
 (\$5518) = \$ABCD3256

Indicate what is in D1, D2, A1 and A2 after the following program fragment is executed:

```
MOVEA.L    4(A1),A1
MOVE.W    #$9000,D1
MOVE.B    0(A1,D1.L),D1
MOVE.W    6(A2,D1.W),D2
```

(A1) = _____

(A2) = _____

(D1) = _____

(D2) = _____

HINT: Look carefully at how addresses are calculated in this problem.

6. Assume that

(\$53EFE)=\$ 0A	(\$53F05)=\$ 00
(\$53EFF)=\$ EE	(\$53F06)=\$ 00
(\$53F00)=\$ 03	(\$53F07)=\$ 00
(\$53F01)=\$ 82	(\$53F08)=\$ 00
(\$53F02)=\$ 0A	(\$53F09)=\$ 00
(\$53F03)=\$ EE	(\$53F0A)=\$ 00
(\$53F04)=\$ 30	(\$60004)=\$ 00

and

(A0)=\$ 0005 3F00

What is in A0 and what memory, if any, is changed when the instruction

```
MOVE.L    (A0)+,(A0)
```

is executed?

ADDRESS REGISTER INSTRUCTIONS AND LABELS:

7. What is in A0, A1 and D2 after the following program fragment is executed? Initially, (A0) = \$10000000, (A1)=\$FFFF0000, and (D2)=\$FFFFFFFA.

```

                ORG          $7200
TABLE1        DC.L          $7000
                DC.L          $7008 AB12
                DC.W          $0100,$0090,$02EE,$AB02
                DC.B          $82
                ORG          $7400
TABLE2        DC.W          $0200,$0290,$01EE,$AC0D
                DC.L          $1000

main7         ORG          $7000
                MOVEA.W      #TABLE1,A0
                MOVEA.W      4(A0),A1
                ADDA         A0,A1

```

(A0) = _____

(A1) = _____ (D2) = _____

STATUS REGISTER:

8. What are the values of the N, Z, V and C flags as each of the following instructions is executed in sequential order. Assume the flags are all initially zero.

Instruction:	X	N	C	V	Z
initial value of SR	0	0	0	0	0
MOVE.W #\$FEC2,D0					
MOVE.W #\$AF5D,D1					
ADD.W D1,D0					

DEBUGGER AND LAB RELATED QUESTIONS:

9. Answer the following questions about the debugger screen shown below:

```

=====Monitor=====12=====Stack=====14==
|1                               || 00000010=4E724E72 |
|2                               || 0000000C=4E724E72 |
|3                               || 00000008=4E724E72 |
|4                               || 00000004=4E724E72 |
|5                               || SP->00000000=4E724E72 |
=====
                                Code                               11 =====Registers=====13==
00009000 41F9 0000 9500      LEA      BUF,A0      |PC=00009010 pi=0000900E|
1 00009006 4E71              NOP              |D0=00000000 A0=00009500|
00009008 323C 0007          MOVE.W  #$7,D1   |D1=00000007 A1=00000000|
0000900C 7400              MOVEQ   #$0,D2   |D2=0000FFFE A2=00000000|
LOOP:
0000900E 1618              MOVE.B  (A0)+,D3  |D3=0000004E A3=00000000|
00009010 5642              ADDQ.W  #$3,D2   |D4=00000000 A4=00000000|
00009012 0C03 0046          CMPI.B  #$46,D3  |D5=00000000 A5=00000000|
00009016 57C9 FFF6          DBEQ   D1,LOOP   |D6=00000000 A6=00000000|
0000901A 33C2 0000 950C      MOVE.W  D2,DAT   |D7=00000000 A7=00000000|
00009020 4E71              NOP              |SR=0010011100000000 |
                                T S   III  XNZVC  |
=====
STATUS: Command      68000  MODULE: exam2_f97      BREAK #: 0  HELP=F5
> Program Step
Breakpt  Debugger  Expression  File  Memory  Program  Symbol  Window
Assign  Block_Operation  Display  Map  Inport  Outport  Unload_BBA  Register

```

(a) According to the above debugger screen what will be the NEXT instruction to be executed? Describe what parts of the screen will change AFTER this instruction is executed. Be as specific as you can.

(b) What debugger command do you use to make MOVE.W #\$7,D1 instruction the NEXT instruction to be executed?

(c) Suppose that the debugger screen does NOT show the correct values. What simple command will redraw the debugger screen?

10. Define the following terms:

(a) memory mapped i/o:

(b) polling

LEA AND ADDRESS REGISTER INSTRUCTIONS:

11. Give the value of A0 after executing each of the following instructions. Assume that (A0)=\$00FF6000, (D0)=\$4371FDEA and (\$6000.L)=\$42B01152 **before** each instruction is executed.

instructions	(A0)
ADDA.W #C000, A0	
SUBA.L #14, A0	
MOVEA.W (A0), A0	
LEA 14(A0, D0), A0	

12. Assume the following data is available for each of the indicated instructions. Give the resulting 32-bit contents of registers D2 and A3 and the contents of memory after executing the instructions independently.

Address	\$012218	\$01221A	\$01221C	\$01221E	\$012220
Contents	\$00F7	\$AB06	\$FFFD	\$01A3	\$000E
(a)					
(b)					
(c)					
(d)					

	D2	A3
initially	\$FFFF000B	\$0001221A
(a)		
(b)		
(c)		
(d)		

- (a) MOVE.L #A3, (A3)+
- (b) LEA (A3), A3
- (c) ADD.W -(A3), D2
- (d) MOVE.B (A3)+, (A3)+