

Here are some sample exams and questions that you can study for your first exam. These are actual problems that have been used on old exams. I have tried to eliminate all the problems of types which will not be on our Friday exam but might have missed a few.

Good luck studying!

Section 1--Computer architecture: organization of the cpu and memory, address and data bus, fetch-execute cycle

1. Consider the hypothetical CASE 1990 microprocessor. It has a 22 bit data bus and a 32 bit address bus. The memory is organized as 11 bit bytes and the smallest unit of memory that the CASE1990 can access is an 11 bit byte. WHAT IS THE RANGE OF MEMORY ADDRESSES THAT THE 1990 CAN ACCESS?

Section 2--UNIX, vi: simple questions about what UNIX and vi commands do

2. Where are each of the following commands used (vi, UNIX, debugger, etc) and describe their function (a sentence or two):

	where	function
a)	dd	
b)	:wq	
c)	ls	
d)	cd ..	

Section 3--number systems:hexadecimal, binary

4. Using 8 bit binary numbers, represent the decimal number -18 in :

- a) two's complement representation
- b) signed magnitude representation

5. What are the decimal equivalents of :

- a) %00101.1011
- b) \$-7A4C

Section 4--mathematics: addition, subtraction, 2's complement

6. Perform the indicated calculations (all values are 2's complement)

a) AF5D+50A3 b) B33C+9555 c) 3D5C-D4EF

Section 5--68000 instructions: assembly, disassembly of simple 68000 instructions (typically add, subtract and move)

7. What is the machine code for the following instruction? Express your answer in hex.

ADD.W D0, \$5000

8. Disassemble the machine code instruction 0479 FFFA 0010 000A. Express your answer as a 68000 assembly language mnemonic complete with appropriate size, extension, etc.

EEAP 282: SAMPLE EXAM #2 with solutions
(originally used on 10/2/91)

Questions 10 and 11 would require that I give you a table of 68000 op words .

2) Exam is closed book, closed notes. Only the M68000 Programmer's Reference Manual and/or Programming Reference Card are allowed to be used.

3) \$ denotes hexadecimal numbers; % denotes binary numbers

4) x**y means, in this sample test, means x to the power y, while x*y means x times y

5) If you have any questions, please send e-mail to ee282

Section 1--Computer architecture: organization of the cpu and memory, address and data bus, fetch-execute cycle

1. Consider the hypothetical CASE 1991 microprocessor. It has a 24 bit data bus and a 17 bit address bus. The memory is organized as 8 bit bytes and the smallest unit of memory that the CASE1991 can access is a 8 bit byte.

a) The CASE 1991 is a _____ bit machine.

b) What is the range of memory addresses taht the 1991 can access?

Section 2--UNIX, vi: simple questions about what UNIX and vi commands do, also included will be how to invoke the assembler, linker and debugger and what each uses as input and output

2. Where are each of the flollowing commands used (vi, UNIX, debugger, etc) and describe their function (a sentence or two):

	where	function
a)	lp	UNIX
b)	:q!	vi
c)	man	UNIX
d)	x	vi

Section 3--number systems:hexadecimal, binary

4. Represent the decimal number -96 in :

- 16 bit two's complement representation
- 16 bit signed magnitude representation

5. What are the decimal equivalentents of :

- %1111 1111.1010 0000 (this is in sign-extended 2's complement representation.
- \$+04F B

Section 4--mathematics: addition, subtraction, 2's complement

6. Perform the indicated calculations (all values are 2's complement 16 bit numbers)

- A5A5+5A5A
- FFFF+0001
- 1234+4321

Section 5--68000 instructions: assembly, disassembly of simple 68000 instructions (typically add, subtract and move)

7. What is the machine code for the following instruction?
Express your answer in hex.
MOVEA.L \$5000,A5

Section 7--68000 programming: assembler format, how to write short programs using a very small number of 68000 instructions (mostly add, subtract and move), what a set of given instructions will do.

9. Assume (D0)=\$0005 3F02, (D1)=\$FFFF 0110

```

                ORG                $1000
                ADD.L              #DATA,DO          (a)
                MOVE.W            DATA,D1          (b)

                ORG                $2000
DATA            DC.B              $0A,$EE,$83,$82
                DC.B              $0A,$EE,$30,$00

```

- a.) What is in D0 after the instruction labeled (a) is executed?
- b.) What is in D1 after the instruction labeled (b) is executed?

These following two problems would be tougher than I would give you. Assume that your assembler outputs the following program segment and answer the the following two questions:

```

000500  3A39 0000 5000
000506  0645 0045
00050A  33C5 0000 0510
000510  0445 0002
000514  0000 0000

005000  0600
005002  0777

```

10. Disassemble the first five lines of the above program listing. Express the program in 68000 mnemonics being sure to explicitly show the size extension.

EXAM #1 SOLUTIONS
October 2, 1992

computer architecture:

1. Consider the hypothetical Case 1992 microprocessor. It has a 10 bit data bus and a 16 bit address bus. The memory is organized as 5-bit bytes and the smallest unit of memory that the 1992 can access is a 5 bit byte.

(a) What is the range of memory addresses that the 1992 can access?

The following coded program data (i.e. instructions) is stored in the 1992's memory beginning at memory location \$1000.

binary data

```
10010 <----$1000, first instruction begins here
10001
11110
10111
00100
11101
00010
00001
01010<----next instruction begins here
11000
```

(b) How many fetch cycles are necessary to completely fetch the instruction? How many execute cycles?

(c) What is the address of the next instruction?

2. Starting at memory address \$2000, memory contains the following sequence of 16-bit values in consecutive memory locations.

```
$1000--> $3039
          $9070
          $D079
          $33C0
          $4E40
```

(a) The byte at \$2003 is:

(b) The word at \$2006 is:

UNIX, vi:

3. Where are each of the following commands used (vi, debugger, UNIX, etc) and describe their function (a sentence or two):

- (a) ESC
- (b) :wq
- (c) cd

number systems:

5. What are the decimal equivalents of

(a) 1011 01112 (this is in sign-extended 2's complement notation) =

(b) 67.2 base 16 =

mathematics:

6. Perform the indicated calculations

(IMPORTANT: All values, including the results, are two's complement 16-bit numbers!)

- | | RESULT | V | C |
|-----|---------------|---|---|
| (a) | \$1732+\$4631 | | |
| (b) | \$F1A5+\$B8D5 | | |
| (c) | \$F1A5+\$D5 | | |

68000 instructions: assembly, disassembly of simple 68000 instructions

7. Disassemble the machine code instruction(s)

\$23F9 0007 FFFF 0640 002C

Express your answer in terms of 68000 assembly language mnemonics complete with appropriate size extension.

68000 programming:

9. A MC68000 system has 32k of memory.

(a) What is its address range? Give your answer in hex.

(b) Indicate if the following instructions will execute without error.

(i) MOVE.W #\$8000,D0

(ii) MOVE.W \$008000,D0

NOTE: This was virtually identical to a homework problem.

10. What is in D0 after the following machine code executes?

(D0.L) = _____

The following table may be of use:

Machine code	assembly language
0440 <number>	SUBI.W #N,D0
0479 <number>,<address>	SUBI.W #N,<address>
0640 <number>	ADDI.W #N,D0
0679 <number>,<address>	ADDI.W #N,<address>
303C <number>	MOVE.W #N,D0
33FC <number>,<address>	MOVE.W #N,<address>
3039 <address>	MOVE.W <address>,D0
33C0 <address>	MOVE.W D0,<address>
4EB9 <address>	BRA <address>
4EF9 <address>	JMP <address>
9079 <address>	SUB.W <address>,D0
9179 <address>	SUB.W D0,<address>
D079 <address>	ADD.W <address>,D0
D179 <address>	ADD.W D0,<address>

NOTE: All numbers are in hex!!!!

address	code
1000	303C
1002	0020
1004	D079
1006	0000
1008	0020
100A	0640
100C	0020
100E	33C0

```

1010          0000
1012          1014
1014          0640
1016          0005

```

```

address data
0020          0400
0022          0002

```

11. Assume (D0)=\$ 0005 3F02, (D1) = \$ FFFF 0110

```

      ORG      $1000
      MOVE.W   #A,D0      (a)
      MOVE.B   CNT,D1     (b)

```

```

      ORG      $2000
CNT   DC.W    $1
BLANK DC.L    $FFA0
SUM   DS.W    1
ICNT  DC.W    3

```

(a) What is in memory beginning at memory location \$2000. Any memory contents not explicitly stated by the code may be indicated by "xx," i.e. if the program doesn't put anything in that location its contents are "xx."

```

address  contents
$2000
$2001
$2002
$2003
$2004
$2005
$2006
$2007
$2008
$2009
$200A
$200B
$200C
$200D

```

(b) What is in D1 after the instruction labeled (b) is executed?
(D1) = _____

