CMPUT 229, Winter 2000 B1

Instructor: Mark Polak
February 16, 2000
Midterm

Name: _____

I.D. #: _____

1) (2 points). Convert the following decimal (base 10) number to binary: 11.625

2. (1 point). Convert the following number into BCD codes: 229

3. (2 points). Convert the following hexadecimal number to decimal: F00AA

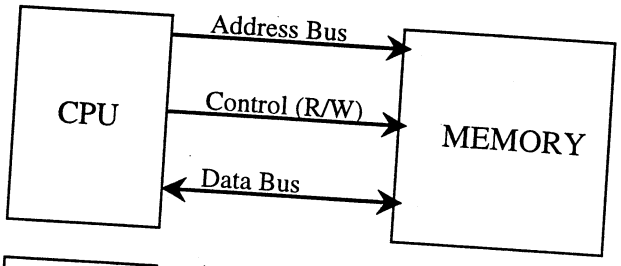
4. (2 points). What is the range of values for a 32 bit number represented in:
   a) One's complement
   b) Two's complement
   Leave your answer in an exponential form.

5. (2 points). Using logical operations (AND, OR, NOT, or XOR), show how you would do the following:
   a) Clear (set to zero) the 3 most significant bytes in a 32-bit register D0, while leaving the rest of the register unchanged.

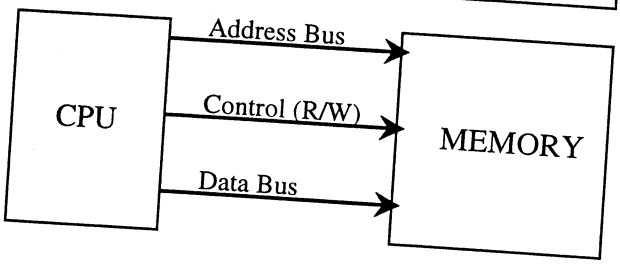
   b) Invert the 4 most significant bits in a 32-bit register D0, while leaving the rest of the register unchanged.

6. (2 points). Which of the following diagrams correctly shows the direction of information transfer on the lines between CPU and memory. Circle the one correct diagram.

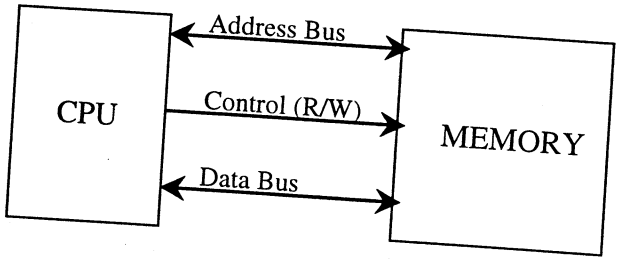
(a)



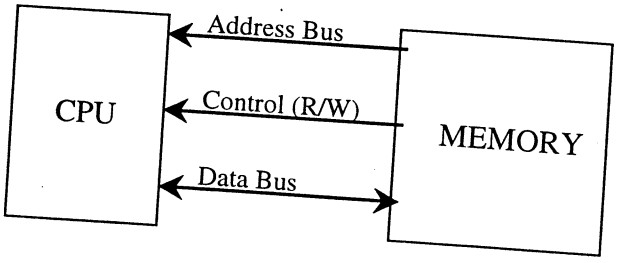
(b)



(c)



(d)



7. (1 point). Explain the difference between machine code and assembly language.

8. (3 points). Fill in the three missing steps in the instruction execution cycle listed below.

   i. _____

   ii. _____

   iii. Determine instruction type.

   iv. If necessary, fetch data for the instruction from memory.

   v. Execute the instruction.

   vi. Store the results, if required.

   vii. _____

9. (4 points). Show the contents of memory location $1000, $1001, $1002, and $1003 after:

   [M[$1000]] ← $12345678

   a) In a Big-Endian machine

   b) In a Little-Endian machine

10. (5 points). Assume memory $1000 to $2000 is filled with zeros (BF 1000 2000 0). Show the contents of memory affected by the following assembler directives. Also show at what address each label is located.

```
        ORG  $1000
START   DC.L  $12345678, $AB
ARR     DS.W  2
VAR     DC.B  $1, 2, 3, $4
```

11. (6 points). Assume the following initial conditions:

D1 = $800A0002
D3 = $0
A1 = $1000
A2 = $1006

```
        $1000: $FF
        $1001: $EE
TABL    $1002: $DD
        $1003: $CC
        $1004: $BB
        $1005: $AA
        $1006: $99
        $1007: $88
```

When each of the following instructions is executed with the initial conditions defined above, show all the modified registers and memory locations. Do not worry about the CCR, and assume that all instructions are independent of each other.

a) MOVE.B TABL(PC, D1.W), D3

b) MOVE.L -4(A2), D3

c) MOVE.B $1000, $1002

d) MOVE.W A1, D1

e) MOVE.L -(A2), (A1)+

12. (12 points). Determine whether the following instructions are valid or invalid in the MC68000. Write "OK" if the instruction would compile, or "NOT ALLOWED" if the instruction is not valid.

a) LEA (A0), D0

b) LEA TABL(PC, D0.L), A0

c) MOVE.L D0, A1

d) MOVE.W $1000, #$1004

e) MOVE.L -20, D0

f) MOVE.L #0, 2(PC)

g) MOVE.B 2(PC, D0.W), -1(A0, D1.L)

h) MOVE.L (A5)-, (A1)+

i) MOVE.W (A0)+, CCR

j) MOVEQ #$FFFF, D0

k) MOVEQ #-120, D0

l) MOVEM.L D0-D7/A0-A6, -(A7)