# ECE 265
# Homework #3

## Problems:

1. What would be the value of the CCR after the instruction `CMPB #$85` is executed if CCR is initially $00 and B contains:

   a) $35?

   b) $A7?

   c) $85?

   Note that the `CMPB` (compare) instruction is exactly like the `SUBB` instruction except that it does not change the contents of the B register.

2. Suppose the contents of the registers are A=$07, B=$89, and CCR=$00 before executing the following *program*:

```
ABA
DAA
```

   Fill in the tables below for the contents of the registers after the `ABA` instruction and after the `DAA` instruction if the numbers to be added are unsigned positive numbers, signed 2's complement numbers, or BCD (decimal) numbers. Be sure to fill in the initial values as well.

| | Unsigned | | | | |
|---|---|---|---|---|---|
| | A | | B | | CCR |
| | Hex | Dec | Hex | Dec | Hex |
| *initial values:* | | | | | |
| Contents after ABA | | | | | |
| Contents after DAA | | | | | |

   Is the sum of the unsigned numbers correct after the `ABA` instruction?

   Is the sum of the unsigned numbers correct after the `DAA` instruction?

| | Signed | | | | |
|---|---|---|---|---|---|
| | A | | B | | CCR |
| | Hex | Dec | Hex | Dec | Hex |
| *initial values:* | | | | | |
| Contents after ABA | | | | | |
| Contents after DAA | | | | | |

Is the sum of the signed numbers correct after the `ABA` instruction?

Is the sum of the signed numbers correct after the `DAA` instruction?

| | BCD | | | | |
|---|---|---|---|---|---|
| | A | | B | | CCR |
| | Hex | Dec | Hex | Dec | Hex |
| *initial values:* | | | | | |
| Contents after ABA | | | | | |
| Contents after DAA | | | | | |

Is the sum of the BCD numbers correct after the `ABA` instruction?

Is the sum of the BCD numbers correct after the `DAA` instruction?

3. Assume that each one of the following branch instructions is fetched from address $F000 and executed. Also, assume that `BACK` is a label that corresponds to address $EFFF. What is the value of the PC after execution of the individual instruction if the initial contents of CCR is $00 or $04? Also, what is the machine code for the instruction?

| | PC | | Machine Code |
|---|---|---|---|
| *initial value:* | CCR=$00 | CCR=$04 | |
| `BRA BACK` | | | |
| `BEQ $F9` | | | |
| `BNE 10` | | | |

4. Fill in the table below by giving the contents of each of the registers whose contents change after execution of the individual instruction. (Note: start with the initial values each time.) Also, fill in the Effective Address (EA) of the data loaded from memory.

   Assume that the instruction is fetched from location $E000. Also, assume that the contents at any address of the data memory is just equal to the lower order byte of the address. (See the figure below on the right.)

| Instruction | X | Y | D | SP | EA |
|---|---|---|---|---|---|
| *initial values:* | $0102 | $0111 | $0A32 | $0102 | |
| LDX $01FF | | | | | |
| LDD $FF,Y | | | | | |
| LDX 10,X | | | | | |
| LDY $FF | | | | | |
| LDAA #$AB | | | | | |
| PULX | | | | | |