EE 308 – Homework 2

Due Jan. 27, 2006

1. Consider the following 8-bit hexadecimal numbers as unsigned. Find their decimal equivalents:

   (a) `0xC4`

   (b) `0x72`

   (c) `0x8E`

   (d) `0x19`

2. Repeat Problem 1, considering the numbers as signed.

   (a) `0xC4`

   (b) `0x72`

   (c) `0x8E`

   (d) `0x19`

3. Do the operations indicated below. The operations are performed in an 8-bit accumulator. Find the 8-bit results for the operations. Indicate the state of the N, Z, C and V bits after each operation.

   (a) `0x3D + 0x7F`

   (b) `0xD2 + 0x9C`

   (c) `0x98 + 0x68`

   (d) `0xC2 - 0x73`

   (e) `0x73 - 0xC2`

4. Write an instruction sequence to swap the contents of memory locations 0x2000 and 0x2001.

5. Write an instruction sequence which adds the contents of accumuator B to the 16-bit number stored at locations $2000 and $2001, and stores the 16-bit result in addresses $2002 and $2003. Treat the value stored in B as a signed number. (Hint: use the `SEX` instruction.)

6. How many instruction cycles will it take the HCS12 to execute the following program? (Do not consider the `swi` instruction.) How many seconds will this take the HCS12 with an 24 Mhz E-clock? (You should give the answer to the nearest microsecond.)

```
prog:     equ       $1000
          org       prog
          ldy       #1000
loop1:    ldx       #500
loop2:    dbne      x,loop2
          dbne      y,loop1
          swi
```

7. An HCS12 has the following data in its memory:

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20D0	10	23	3B	7C	10	04	86	80	B7	10	25	3B	FC	10	18	F3
20E0	20	F5	FD	10	18	86	40	B7	10	23	3B	FC	10	12	DD	02
20F0	86	02	B7	10	23	3B	7C	10	03	86	40	B7	10	25	3B	86

Determine the contents of the A and X register after executing the following code fragments. (Before the first instruction, the X register has 0x0000.) List the value in hexadecimal. Also, indicate what addressing mode is used, and what the effective address of the instruction is. (Assume that the first instruction is at address 0x1000.)

(a)
```
ldaa #37
```

(b)
```
ldaa $20E7
```

(c)
```
ldx $20E0
ldaa -2,X
```

(d)
```
ldx #$20E0
ldaa -2,X
```

(e)
```
ldx #$20E0
ldaa 2,+X
```

(f)
```
ldx #$20E0
ldaa 2,X+
```