EE 308 – Homework 3

Due Feb. 8, 2012

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

   (a) `0xA2`
   (b) `0x63`
   (c) `0xF5`
   (d) `0x4F`

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

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) `0x5A + 0x7C`
   (b) `0xC7 + 0x92`
   (c) `0xC2 + 0x7A`
   (d) `0xA5 + 0x5B`
   (e) `0xC2 - 0x13`
   (f) `0x5A - 0xC5`
   (g) `0x5A - 0xF5`

4. Reverse assemble the following HC12 op codes. The first byte of data is at address $2000.

   ```
   86 17 99 02 87 62 05 26 FB 3F
   ```

   Indicate what instructions these bytes correspond to. For each instruction indicate the addressing mode which is used.

5. Repeat Problem 4 for the following op codes:

   ```
   DC 12 34 18 06 AB 2B 18 26 05 6B B7 05 04 36 F0
   ```

6. Which of the conditional branch instructions in the following list will cause a branch to be taken if the condition code flags are: `N=0, Z=1, V=1, C=0`:

   (a) BCC label
   (b) BNE label
   (c) BGE label
   (d) BGT label
   (e) BHI label
   (f) BMI label
   (g) BLS label

7. Consider the following instructions. Indicate what addressing mode(s) is (are) used, what the effective address(es) is (are). For the last 4, show whate the value of the Y register will be after the instruction. Assume for each part the the Y register starts with a value of 0x1100, and that the first byte of the instruction is at address 0x2000.

   (a) `LDAA $4A`

   (b) `STAA $1101`

   (c) `LDD #$AC12`

   (d) `LDX 5432,Y`

   (e) `SUBA 8,+Y`

   (f) `DEC 2,Y-`

   (g) `MOVW #$ABCD,8,+Y`

8. Below shows a sequence of instructions to be executed by a 68HCS12. Fill in the table, showing the value in accumulator `B` and the state of the condition flags `N, Z, V` and `C` after each instruction. The table shows the initial value of the condition flags and `B`

Instruction	Accumulator B	N	Z	V	C
	$00	1	0	1	0
LDAB #$9A					
ADDB #$67					
DECB					
LDAB #$7A					
CMPB #$C3					
ROLB					
COMB					
CLRB					

9. Write a program fragment to produce a software delay of 100 ms. You can use loops similar to Problem 9 of Homework 2.

10. Write a program to count how many 8-bit numbers in memory locations 0x8000 to 0x80ff are negative, and how many are zero. Store the count of negative numbers in address 0x1000, and the count of zeros in address 0x1002. Treat the numbers in memory as signed.

11. Write a program which puts the exclusive OR of the eight-bit numbers from memory locations 0x8000 through 0x8FFF and store the answer in address 0x0001.