EE 308

Exam 1

February 27, 2009

Name: _____

You may use any of the Freescale data books. No calculators allowed. Show all work. Partial credit will be given. No credit will be given if an answer appears with no supporting work.

1. Fill in the blanks in this table. The numbers are stored in an 8-bit register.

Hex	Binary	Unsigned Decimal	Signed Decimal
C3			
		56	
			-82
	01110110		

2. The following operations are done in accumulator A of an 9S12. Indicate the answer in accumulator A, and the state of the flags after the operations.

	58 + 7B	D9 + AC	D7 + F2	C7 - DA	53 - AF
Acc. A					
C					
V					
N					
Z					

3. Draw the stack frame (the memory where the stack is located) and enter the value of each stack slot (if it is known) at the end of the following instruction sequence. Also, indicate the value of the stack pointer after the eight instructions have been executed. (The number on the left is the hex value of the address where the instruction is stored

```
2000              lds    #$3C00
2003              clrb
2004              ldaa   #$AA
2006              pshd
2007              ldx    #$1234
200A              bsr    sub_123

   ...

2020  sub_123:    leas   -4,sp
2022              stx    2,sp
```

4. Reverse assemble the following HC12 op codes:

```
CE 27 F8 D3 02 04 25 CB b7 21 18 00 2D 12 34
```

Indicate what instructions these bytes correspond to. For each instruction indicate the addressing mode which is used. The first instruction is located at address $2000.

5. Below are some data in the HC12 memory:

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1000	D6	05	35	CF	E0	00	FE	08	20	A6	00	47	6A	05	08	53
1010	26	F7	34	C6	C8	CD	9C	40	03	26	FD	53	26	F7	3D	3F
1020	07	C2	3A	68	F3	09	C2	67	9A	0F	AA	55	08	40	CD	CF

Using the above memory values, consider the instructions below.

- Indicate the starting address for each instruction. (Note that the first instruction is at address `$2000`.)
- Indicate the values in the registers (in hex) after the HC12 executes each of the instructions. (If the instruction does not change a register, you may
  leave that entry blank.)
- Show the state of the N, Z, V and C condition code bits after each instruction has been executed.
- Indicate the addressing mode used by each instruction.
- Indicate the effective address of each instruction.
- Write down the number of cycles needed to execute each instruction.

Address	Instruction	D		X	Y	SP	N	Z	V	C	Addressing Mode	Effective Address	Number of Cycles
		A	B										
		AA	DD	1010	1000	1020	1	0	1	1			
$2000	`ldy #$101A`												
	`ldy $101A`												
	`cmpb #$7E`												
	`puly`												
	`negb`												
	`addd 5,X`												
	`leas -8,SP`												
	`ldaa 2,-X`												