EE 308 – Homework 4

Due Feb. 14, 2005

1. Find the values of the `N`, `Z`, `C`, and `V` bits of the `CCR` register after execution of each of the following instructions, given that `(A) = $5A` and the condition flags are `N=1`, `C=0`, `Z=0`, and `V=1`. (Assume these are the values before each instruction starts – e.g., do not use the flag state resulting from the instruction in part (a) as the initial state for part (b).)

   (a) `ADDA #$5C`
   (b) `ADDA #$27`
   (c) `LSRA`
   (d) `CMPA #$60`
   (e) `SUBA #$40`
   (f) `ASLA`

2. Suppose you started with the following register contents:

   P-C007 Y-7892 X-FF00 A-44 B-70 SP-C04A

   Wht address is in the stack pointer and exactly what is in the stack after the following instructions sequence is executed:

```
PSHA
PSHB
PSHY
```

3. Write a subroutine to copy data one byte at a time from memory location $2000 to memory location $3000 until a byte with $FF is detected.

4. Below are some data in the HC12 memory:

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0900	D6	05	35	CF	E0	00	FE	08	20	A6	00	47	6A	05	08	53
0910	26	F7	34	C6	C8	CD	9C	40	03	26	FD	53	26	F7	3D	3F
0920	07	C2	3A	68	F3	09	C2	67	9A	0F	AA	55	08	40	CD	CF

   Indicate the values in the registers after the HC12 executes the following instructions. Also write down the number of cycles needed to execute each instruction. Show what will be in the registers (in hex) after each of the instructions. If the instruction does not change a register, you may leave that entry blank. Note that the first instruction is located at address `0x0800`.

Instruction	D		X	Y	SP	N	Z	V	C	Addr Mode	Effective Address
	`A`	`B`									
	AA	25	0910	0900	0A00	1	0	1	0		
`lds #$0920`											
`anda 2,x-`											
`tap`											
`puly`											
`staa $01`											
`bita $0913`											

5. Below is the listing from the Cosmic Assembler after assembling a simple program. Because of a bad printer, a few of the entries are blank. There is sufficient information in the listing to determine what the missing information is. Fill in the blanks with the correct values.

```
 1
 2        00001000      prog:       equ         _____
 3        00002000      data:       equ         $2000
 4        ________      stack:      equ         $3c00
 5        00000000      PORTA:      equ         $00
 6        00000002      DDRA:       equ         ___
 7
 8                      CODE:       section     .text
 9   1000                           org         prog
10   1000 ______                    lds         #stack
11   1003 180bff0002                movb        #$ff,DDRA
12   ____ ce2000        loop1:      ldx         #table
13   100b 180d300000    loop2:      ____        1,x+,PORTA
14   1010 ______                    jsr         delay
15   1013 8e2008                    cpx         #table_end
16   1016 23f3                      bls         _____
17   1018 20ee                      bra         _____
18
19   101a 36            delay:      psha
20   101b __                        pshx
21   101c 86fa                      ldaa        _____
22   101e ce0c80        l1:         ldx         #3200
23   1021 0435fd        l2:         dbne        x,l2
24   1024 0430f7                    ____        a,l1
25   1027 30                        pulx
26   1028 32                        pula
27   1029 3d                        rts
28
29                      DATA:       section     .data
30   2000                           org         data
31   2000 ________      table:      dc.b        $00,$80,$C0,$E0
32   ____ f0f8fcfe                  dc.b        $F0,$F8,$FC,$FE
33   2008 ff            table_end:  dc.b        $FF
```

6. Write a program fragment which will make Bits 6, 4, 2, and 1 of Port A output, and the other bits of Port A input.