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

What 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:

<table>
<thead>
<tr>
<th>0900</th>
<th>D6</th>
<th>05</th>
<th>35</th>
<th>CF</th>
<th>E0</th>
<th>00</th>
<th>FE</th>
<th>08</th>
<th>20</th>
<th>A6</th>
<th>00</th>
<th>47</th>
<th>6A</th>
<th>05</th>
<th>08</th>
<th>53</th>
</tr>
</thead>
<tbody>
<tr>
<td>0910</td>
<td>26</td>
<td>F7</td>
<td>34</td>
<td>C6</td>
<td>C8</td>
<td>CD</td>
<td>9C</td>
<td>40</td>
<td>03</td>
<td>26</td>
<td>FD</td>
<td>53</td>
<td>26</td>
<td>F7</td>
<td>3D</td>
<td>3F</td>
</tr>
<tr>
<td>0920</td>
<td>07</td>
<td>C2</td>
<td>3A</td>
<td>68</td>
<td>F3</td>
<td>09</td>
<td>C2</td>
<td>67</td>
<td>9A</td>
<td>0F</td>
<td>AA</td>
<td>55</td>
<td>08</td>
<td>40</td>
<td>CD</td>
<td>CF</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Instruction</th>
<th>D A</th>
<th>B</th>
<th>X</th>
<th>Y</th>
<th>SP</th>
<th>N</th>
<th>Z</th>
<th>V</th>
<th>C</th>
<th>Addr Mode</th>
<th>Effective Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>lds #$0920</td>
<td>AA</td>
<td>25</td>
<td>0910</td>
<td>0900</td>
<td>0A00</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<td>anda 2,x-</td>
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<td>staa $01</td>
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<td>bita $0913</td>
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</table>
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.

```
00001000 prog: equ _____
00002000 data: equ $2000
_______ stack: equ $3c00
00000000 PORTA: equ $00
00000002 DDRA: equ ___

CODE: section .text
1000 org prog
1000 _____ lds #stack
1003 180bff0002 movb #$ff,DDRA
____ ce2000 loop1: ldx #table
100b 180d300000 loop2: _____ 1,x+,PORTA
1010 _____ jsr delay
1013 8e2008 cpx #table_end
1016 23f3 bls _____
1018 20ee bra _____

101a 36 delay: psha
101b __ pshx
101c 86fa ldaa _____
101e ce0c80 l1: ldx #3200
1021 0435fd l2: dbne x,l2
1024 0430f7 _____ a,l1
1027 30 pulx
1028 32 pula
1029 3d rts

DATA: section .data
2000 org data
2000 _____ table: dc.b $00,$80,$C0,$E0
____ f0f8fcfe dc.b $F0,$F8,$FC,$FE
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.