Assignment 2C (40 marks) – Lab Week Eight
Due: End of your week Nine's lab period: Week of 18 – 23 Mar 2018

Name: _____ ***Indicate Your Lab Period*** ***/ 40 marks***

Student Number: _____ _____

SOLUTION SET

TASK One – (7 marks) – A Simple Hardware Programming Exercise

Code Inspection (3 marks):

a. The filename for the code should be "as provided" in this assignment and *your Student Information* should be evident in the program header.
b. The code should be correctly aligned with all Labels, Opcodes, Operands and Comments in their correct columns as discussed in a previous lecture.
c. The program code should contain the missing two lines of code in the correct location in the source code.
d. The two supplied library files must be in the correct folder on your system.

Program Demo (4 marks): The program must run in the simulator without error *on the first demonstration attempt.*

Professor's Initials _____ ***/7 (In-class Code Inspection + Demo)***

Task Two – Those were the Memories (10 marks)

Complete the following hardware-based memory maps according to the instructions contained within this assignment:

Pre-Execution Memory Map

	← 8 bits →
$1000	$3F
$1001	$0D
$1002	$80
$1003	— —

Post-Execution Memory Map

	← 8 bits →
$1030	$80
$1031	$01
$1032	— —
$1033	$10
$1034	$0D
$1035	$80

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Task Three –BCD Arithmetic (8 Marks) (8 marks) To confirm your understanding of BCD Arithmetic methods, represent the following base 10 numbers in BCD and then correctly perform BCD addition. ***Show all steps (including all annotations to the right of the additions as per the BCD Arithmetic video) for full credit.***

a. Add 86 + 21

```
86: 1000 0110   86 in BCD
21: +0010 0001  21 in BCD
    1010 0111   INVALID BCD
  + 0110 0000   UPPER NIBBLE
                ADD 60
0001 0000 0111
   1    0    7   107 BCD
```

b. Add 572+ 299

```
572: 0101 0111 0010   572 in BCD
299: +0010 1001 1001  299 in BCD
     1000 0000 1011   Invalid BCD
   + 0000 0000 0110   lower Nibble
                      Add 6
     1000 0001 0001   Invalid BCD
   + 0000 0110 0000   Middle Nibble
                      because of
     1000 0111 0001   Carry out
        8    7    1   Add 60
```

871 BCD

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Assignment 2C (40 marks) – Lab Week Eight

Due: End of your week Nine's lab period – Week of 4 – 18 Dec 2017

Task Four – Write Some Code Snippets (15 Marks)

Course Text - 68HCS12Text

HCS12-9S12 Instruction Set Reference

HCS12 Assembly Language Reference Manual

Using the resources available on Blackboard in the Resources folder, lecture material, and your class notes write a single line of code, using the HCS12 Instruction Set, that performs the following:

Hints:

I. Since The HCS12-9S12 Instruction Set Reference will be provided to you on Term Test Two and the Final Exam, it may be a good idea to look through that document first.
II. You would also gain better experience with the instruction set if you actually coded these one-line snippet of code to see how they work.

Required Operation	Line of Code
a. Loads Accumulator A with the value of 8	ldaa #8 or ldaa #$08
b. Loads Accumulator B with the contents of memory address $1005	ldab $1005
c. Increments Accumulator B	incb
d. Decrements Accumulator A	deca
e. Compares the values in Accumulators A and B	cba
f. Exchanges Register Y and X's values	exg y,x
g. Adds Accumulator A and B	aba
h. Compares Accumulator B with the contents of memory address $1A00	cmpb $1A00
i. Points X to memory address designated by the label Max_Value	ldx #Max_Value
j. Loads Y with the contents of memory designated by the label Car_Value	ldy Car_Value
k. Logically shifts Accumulator B to the Right	lsrb
l. Subtracts B from A	sba
m. Transfers A to B	tab
n. Stores D at a memory location designated by the label Temp	std Temp
o. Loads D with the value $1234	ldd #$1234

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