Assignment 2A (20 marks) – Lab Week Six Hand-In Sheet

Due Dates: Part B – End of your week Seven's lab period (including handing in this Hand-In Sheet)
Part A – Multiple Choice Submission on Blackboard before Friday, 9 Mar 2018 @ 11:59 p.m.

Name: _____   **Write in your Lab Day and Time (e.g. Wed 10 – 12)**

Student Number: _____   _____

First Assembly Program

Using the hybrid video *First ASM 15W Update,* this lab exercise leads you through the Software Engineering Analysis, Design and Testing stages of the solution of a simple arithmetic problem using 68HCS12 Assembly Language as the target language. The Assembler and Simulator that will be used for the lab should have been installed during Lab Week One (Hybrid), and can be found in your list of programs in the Windows environment under *Designing with Microcontrollers – The 68HCS12. **AsmIDE*** is the name of the assembler, while ***Simulator – Dragon12 & Student Mode*** is the simulator that we will use for this lab exercise. The Resources folder on Blackboard also contains other valuable sources of information that you can refer to regarding Assembly Language programming.

PURPOSE OF LAB:

The purpose of this lab is to become familiar with both the assembler and simulator that will be extensively used in this course. Additionally, the lab will introduce you to assembly language concepts and the terminology used in this type of programming environment. You should make notes pertaining to the content of the lab video *First ASM Program 15W Update* and understand the concepts presented, as other assessments in the course will test you on this knowledge.

Part A – (10 marks) Multiple Choice Questions (based on the Hybrid Video – First ASM Program 15W Update and the 15 Feb 2018 Lecture)

- Answer the multiple-choice questions for this lab assignment ***using the link on Blackboard***. Your Blackboard Gradebook mark will be incorporated into your mark for this assignment.

Part B (10 marks) – Submit this marking guide and a hardcopy of First.lst, printed from the assembler AsmIDE.
- To ensure that you avoid word wrap of the, you will have to use File -> Printer Setup from AsmIDE's main menu and the set the print up for Landscape mode.
- After setting up the printer, and assembling First.asm, you can then click on the First.lst tab in AsmIDE and to print the listing. When the Print file dialogue appear, uncheck Wrap long lines so that there is no word wrapping of the listing

Do not print your submission from any other source or cut and paste it into a document; otherwise, you will receive a mark reduction of 5 marks for PART B.

Ensure that your source code very closely resembles my version, including the placement of the comments, but modify the header information to reflect ***your*** Student Information and the correct date, which is the date you assembled the finalized code.

I advise you to use the TAB key in ***AsmIDE*** for column spacing to be consistent in the program's layout. Ensure that your submitted copy contains the following (2 marks for each category)

First.lst submission Assessment (see sample printout on the next page)

Item	Marks
Correct header information	
Correct addresses	
Correct column spacing	
Correct code	
Correct comments	

Your mark	/10

```
1  ; First.asm
2  ;
3  ; Author:              D. Haley
4  ; Student Number:      nnn-nnn-nnn
5  ; Date:                19 Feb 2018
6  ;
7  ; Purpose:             Add the following values: $25 + $37 - $1
8  ;
9          org     $1000   ; Set current location to start of RAM
10 p:      db      $25     ; First addend is at location p
11 q:      db      $37     ; Second addend is at location q
12 r:      ds      1       ; Sum will be stored at location r
13
14         org     $2000   ; Set current location to start in RAM
15         ldaa    p       ; load value at p into accumulator a
16         adda    q       ; add value at q into accumulator a
17         deca            ; subtract one from the value in a
18         staa    r       ; store accumulator a at location r
19         end
20
```

Example printout of First.lst from AsmIDE

```
as12, an absolute assembler for Motorola MCU's, version 1.2h

                         ; First.asm
                         ;
                         ; Author:           D. Haley
                         ; Student Number:   nnn-nnn-nnn
                         ; Date:             19 Feb 2018
                         ;
                         ; Purpose:          Add the following values: $25 + $37 - $1
                         ;
1000                         org    $1000    ; Set current location to start of RAM
1000 25              p:      db     $25      ; First addend is at location p
1001 37              q:      db     $37      ; Second addend is at location q
1002                 r:      ds     1        ; Sum will be stored at location r

2000                         org    $2000    ; Set current location to start in RAM
2000 b6 10 00                ldaa   p        ; load value at p into accumulator a
2003 bb 10 01                adda   q        ; add value at q into accumulator a
2006 43                      deca            ; subtract one from the value in a
2007 7a 10 02                staa   r        ; store accumulator a at location r
                             end


Executed: Mon Feb 19 10:33:32 2018
Total cycles: 13, Total bytes: 12
Total errors: 0, Total warnings: 0
```

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