**ENCM 515 – Lab 1**

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| Group # |  | Date: |
| Student name(s) |  | |
|  | |
|  | |
|  | |
| Instructor/TA |  | |

**To submit:**

* **Add your lab sheet (as PDF if possible) and your main.c to a zip archive and upload to D2L.**

**PART ONE**

**LEDs**

LD3 – colour: ORANGE – I/O Port: PD13

LD4 – colour: \_\_\_\_\_\_\_\_\_\_– I/O Port: \_\_\_\_\_\_\_\_\_\_\_\_\_

LD5 – colour: \_\_\_\_\_\_\_\_\_\_– I/O Port: \_\_\_\_\_\_\_\_\_\_\_\_\_

LD6 – colour: \_\_\_\_\_\_\_\_\_\_– I/O Port: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Push Button**

B1 – I/O Port: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B2 – RESET, I/O Port: NRST

# Q1: What is the base address of the peripheral space?

# Q2: What are the functions for each of the buttons A – H?

# Q3: How much time is elapsed between each WRITE? Is this expected?

# Q4: Take a screenshot of the SWV Data Trace Timeline Graph. You might need to wait some time to get an interesting shape to appear. Alternatively, adjust your delay so that the Loop value is incremented more often.

# Q5: Copy the listing for the test\_assembly function and annotate it. Mark which lines of assembly correspond to what you’ve written and what corresponds to the compiler-inserted code for the Calling Convention. Explain what’s going on (e.g., here we can see the registers that will be overwritten are being saved on the stack…. Now we see them restored…)

**PART TWO**

# Q1> **Screenshot** of the console output (name, date, joke)

# Q2> Time stamps and cycles for the two ITM Port 31 entries (screenshot should suffice).

## How many clock cycles are there between the two writes to the ITM Port 31?

## How much time has elapsed?

## What is the average amount of time taken for each loop iteration?

# Q3 > > How many clock cycles are taken to perform the floating point function?

|  |  |  |  |
| --- | --- | --- | --- |
| **Test** | **Value of A** | **Value of B** | **Clock Cycles needed** |
| **1** |  |  |  |
| **2** |  |  |  |
| **3** |  |  |  |
| **4** |  |  |  |
| **5** |  |  |  |

# Q4 > How many clock cycles are taken to perform the floating point function now? Include a screenshot of the SWV Trace Log.

# Q5 > Fix the code snippet so that the correct values are loaded in a and b. Paste your completed function here.

# Q6> Take a screenshot of the Variables window after calling these functions. What do you observe?

# Q7> Write a reflection of what you have observed and learned in this lab [approx.. 200 words max.]. Which lecture concepts did you encounter here?