Quiz #2

Due: Wednesday September 13 – by 4:10 PM (Before Class)
Submission: Solve on paper submit results to Carmen

Solve all questions on paper first. When ready start Quiz 2 on Carmen to enter your answers.

This quiz is individual work. You can consult class notes, use calculators and conversion tools, but you are not allowed to collaborate with other students.

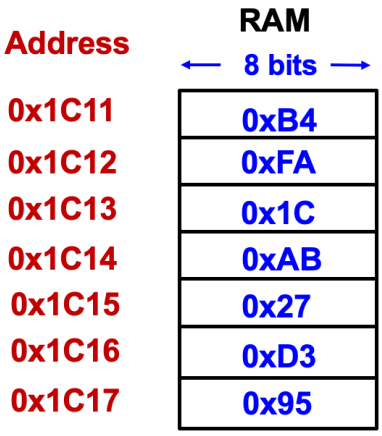
Question 1 (7 points)
How well do you know MSP430FR6989? What is the …

- Width of the data bus?
- Width of the address bus?
- Address of the first byte of RAM?
- Address of the last byte of RAM?
- Size of RAM?
- Start address of the FRAM?
- Size of FRAM (Hint: Not 128 kB)

Question 2 (5 points)
The MSP430X family (X stands for eXtended) can handle a larger amount of memory since it has a 20-bit wide address bus. This family of processors is built based on a von Neumann architecture and is byte-addressed as well. What is the **maximum number of bytes** that can be addressed? Enter a decimal value.

Question 3 (6 points)
Using the mov.w instruction we copy the 16-bit word 0xB612 to the address 0x1C20. You do not need to know any details of the instruction here, all you care is that the word (i.e., 16 bits) is stored at the given address.
(a) What is the byte that is stored in location 0x1C1F?
(b) What is the byte that is stored in location 0x1C20?
(c) What is the byte that is stored in location 0x1C21?

Question 4 (12 points)
Below is a snapshot of seven consecutive registers in RAM of the MSP430FR6989. Each register has a 16-bit address – displayed as a 4-digit hex value in red from 0x1C11 to 0x1C17; and each register stores 1 byte (8 bits) of information – displayed as a 2-digit hex value in blue.



All the bytes can be accessed individually. When we want to access words instead of bytes, i.e., 16 bits instead of 8 bits, we have to keep in mind the rules of **word alignment** and **endianness** of the MCU. Which of the options listed below are valid words?

(a) Word with value 0xB4FA at address 0x1C11
(b) Word with value 0xFAB4 at address 0x1C11
(c) Word with value 0xAB1C at address 0x1C13
(d) Word with value 0xAB27 at address 0x1C14
(e) Word with value 0x27AB at address 0x1C14
(f) Word with value 0x95D3 at address 0x1C16