
ECE 375 LAB 3

Introduction to AVR Simulation with Atmel Studio

Lab Time: Wednesday 5-7pm

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STUDY QUESTIONS

Simulating the Sample Code – Part 1

2. *What is the initial value of DDRB?*

0x00

What is the initial value of PORTB?

0x00

Based on the initial values of DDRB and PORTB, what is Port B's default I/O configuration?

Input mode, no pullup resistor, if PINB2 read returns state of pin

5. *What 16-bit address was the stack pointer just initialized to?*

0x10FF

6. *What are the current contents of register r0?*

0xFF

7. *How many times did the code inside the loop structure end up running?*

4 times

Which instruction would you modify if you wanted to change the number of times that the loop runs?

`ldi r0, $04`

What are the current contents of register r1?

0xAA

8. *What are the current contents of register r2?*

0x0F

9. *What are the current contents of register r3?*

0x0F

Simulating the Sample Code – Part 2

1. *What is the value of the stack pointer now that your program flow has moved inside of a subroutine?*

0x10FD

2. *What is the final result of FUNCTION? (What are the hexadecimal contents of memory locations \$0105:\$0104?)*

0e ba

CHALLENGE

1. *What type of operation does the FUNCTION subroutine perform on its two 16-bit inputs? How can you tell? Give a detailed description of the operation being performed by the FUNCTION subroutine.*

The FUNCTION subroutine does an addition on the lower half of registers with the addresses found in X and Y. Then it does an addition on the higher half with a carry. If there is a carry, it is then stored in register Z. If not, the function will exit.

2. *Currently, the two 16-bit inputs used in the sample code cause the “brcc EXIT” branch to be taken. Come up with two 16-bit values that would cause the branch NOT to be taken, therefore causing the “st Z, XH” instruction to be executed before the subroutine returns.*

All it would take is for a carry to occur. So FF and FA added together would cause the carry to be set, not cleared, and the branch would not be taken.

3. *What is the purpose of the conditionally-executed instruction “st Z, XH”?*

To keep track of a possible overflow from the addition with carry. If there is a carry, this instruction is executed to store it in Z.