

# ECE 375 Lab 3

Intro to AVR Simulation

Lab Time: Wednesday 10a-12n

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TA Signature

## Lab Questions

1. What is the initial value of DDRB?

00

2. What is the initial value of PORTB?

00

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

Input with no pull-up resistor.

4. What 16-bit address (in hexadecimal) is the stack pointer initialized to?

10FF

5. What are the contents of register r0 after it is initialized?

FF

6. How many times did the code inside of LOOP end up running?

4 times

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

`ldi i, $04` – change the immediate value to the desired count

8. What are the contents of register r1 after it is initialized?

AA

9. What are the contents of register r2 after it is initialized?

0F

10. What are the contents of register r3 after it is initialized?

0F

11. What is the value of the stack pointer when the program execution is inside the FUNCTION subroutine?

10FD

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

BA:0E

## Challenge Questions

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.

This function is adding two 16-bit numbers (\$0101:\$0100 and \$0103:\$0102) and stores the result in \$0105:\$0104.

It does this by adding each byte of the word separately and propagating the carry to the second add.

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.

Any values that overflow the 16-bit word would cause the carry flag to be set after the second add, and thus avoid the branch. E.g., `$aa00 + $faba`.

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

If there was an overflow (i.e. the carry bit was set), this instruction sets the next byte in RAM (\$0106) to \$01.