CS150 - Computer Organization and Architecture
Homework #5 - Spring 2024

1. The diagram below depicts a portion of program memory in a running atmega328P. Please decode each of the instructions that appear in memory and place the assembly language mnemonic for each instruction on the line appearing to its right. The first instruction has already been decoded for you.

Program Memory

Address	Contents	Mnemonic
x00FF	1 1 1 0 0 0 0 1 0 0 1 0 1 0 0 0	ldi r18,0x18
x0100	1 1 1 0 0 1 1 1 0 0 0 0 1 1 0 0	ldi r16,0x7C
x0101	1 0 0 1 0 0 1 1 0 0 1 1 0 0 0 0	sts 0x00BD, r19
x0102	0 0 0 0 0 0 0 0 1 0 1 1 1 1 0 1	
x0103	0 0 0 0 1 1 1 0 0 0 0 0 0 0 1 0	add r0, r18
x0104	1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1	rjmp .-2

2. The following is a snippet of an assembly language program that will be hosted on the atmega328P. Please encode each of the instructions that appear in this snippet into its machine code equivalent on the line appearing to its right. The first instruction has already been encoded for you.

Program Memory

Instruction	Machine Code
push r18	1001 0011 0010 1111
or r19, r18	0010 1011 0011 0010
com r19	1001 0101 0011 0000
eor r18, r18	0010 0111 0010 0010
eor r18, r19	0010 0111 0010 0011
pop r18	1001 0001 0010 1111