# Exercise 7 Problems

Do NOT use a calculator on this assignment. You will not be allowed to use one on the test or quizzes.

Assume that the following statements have already been defined for all problems.

PORTB EQU $0001

DDRB EQU $0003

PTP EQU $0258

DDRP RQU $025A

PTH EQU $0260

DDRH EQU $0262

PPSH EQU $0265

PIEH EQU $0266

PIFH EQU $0267

1. Perform the following operations using assembly without affecting any other bits.
   1. Configure pins 7, 6, 5, and 4 of Port H to inputs and the others to outputs
   2. Configure all pins of Port B to outputs
   3. Configure pins 0 and 1 of Port B to outputs
   4. Configure pins 2, 3, and 4 of Port P to inputs
2. Perform the following operations using assembly without affecting any other bits. Assume that the ports are already appropriately configured.
   1. Output 1’s on pins 2, 3, and 4 of Port B and 0’s on other pins.
   2. Output 1’s on pins 2, 3, and 4 of Port B.
   3. Output 0’s on pins 1, 3, and 6 of Port P and 1’s on other pins.
   4. Output 1’s on pins 2, 3, 4, and 5 of Port P.
   5. Set pin 3 of Port P to 1 if pin 3 of Port H is 0.
   6. Set pins 3, 2, 1, and 0 of Port P to 1 if pins 2 and 3 of Port H are 0.
   7. Set pins 3, 2, 1, and 0 of Port P to 1 if pin 2 or pin 3 of Port H is 0.
3. For each task below, write an assembly subroutine, write the C function prototype, and write the call to the function in C with the variables defined.
   1. Convert an unsigned char to an unsigned long. The unsigned char is the sole input, and the unsigned long is the only output.

unsigned char inchar;

unsigned long outlong;

* 1. Convert a signed char to a signed long. The signed char is the sole input, and the signed long is the only output.

unsigned char inchar;

unsigned long outlong;

* 1. The first two parameters passed are signed long ints. The third parameter is a pointer to a signed long int, and the fourth parameter is a pointer to an unsigned char. The subroutine subtracts the second number from the first, returns the answer in the pointer to the long int, and the char pointed at should be 0x00 for no signed overflow and 0xFF for signed overflow. There is no returned value.

signed long minuend;

signed long subtrahend;

signed long difference;

unsigned char overflow;

* 1. The subroutine adds a list of two-byte unsigned numbers. The address of the list is passed first, the two-byte length is passed second, and the sum is returned. Overflow is not considered.

#define ARRAYLEN 100

unsigned int arraylength = ARRAYLEN;

unsigned int array[ARRAYLEN];