Homework 5

1. What is the consequence if a computer architecture does not have a status register like the one in AVR?

- Some consequences of not having a status register include slowing down the processor, more lines of instruction required, uses more memory and makes assembly programming more difficult.

2. Determine the C, Z, V, S, N flags of the status after the following instructions:

1) LDI R18, 25  
   CPI R18, 0x25

- C=1 Z=0 V=0 S=1 N=1   
  
2) LDI R18, 25    
    LDI R19, 240    
    ADD R18, R19

- C=1 Z=0 V=0 S=0 N=0

3. Determine the value of R1 and R0 after the following multiplications

1) LDI R20, -1   
    LDI R21 -5,   
    MUL R20, R21

- R0= 0x05 R1= 0xFA

2) LDI R20, 128   
    LDI R21, 255   
    MULS R20, R21

- R0= 0x80 R1= 0x00

3) LDI R20, 135   
    LDI R21, -10   
    MULSU R20, R21

- R0= 0xBA R1= 0x8B

4. Revise the unsigned integer division in class and write a program to take two signed numbers A / B and return the quotient and the remainder.

; INPUT:

; NUMERATOR saved in R20

; DENOMINATOR saved in R21

; OUTPUT:

; QUOTIENT saved in R22

; REMAINDER saved in R20

LDI R20, A

LDI R21, B

CLR R22

L1:

INC R22

SUBI R20, R21

BRCC L1

DEC R22

ADD R20, R21

5. Convert the following C code to assembly. Both x and y must be treated as signed numbers.

int x＝5, y＝－5;  
if(x > y) {  
    y = x + 2;  
} else if (x > y - 3) {  
    y = x + 5  
} else {  
    y = x + 7

LDI R18, 5

LDI R19, -5

SUB R19, R18

BRLO IF

LDI R21, 3

SUB R19, R21

SUB R19, R18

BRLO ELSEIF

ELSE:

LDI R20, 7

ADD R18, R20

LDS R19, R18

RJMP DONE

IF:

LDI R20, 2

ADD R18, R20

LDS R19, R18

RJMP DONE

ELSEIF:

LDI R20, 5

ADD R18, R20

LDS R19, R18

RJMP DONE

DONE:

RJMP DONE