Quiz 2
(October 14th @ 5:30 pm)

PROBLEM 1 (40 PTS)
- Given a 25 MHz bus clock, provide a set of instructions to generate a time delay of 40 ms. Consider that pusha takes 2 cycles, pula 3 cycles, nop one cycle and dbne 3 cycles.

PROBLEM 2 (20 PTS)
- Complete the Assembly Program below so that the state of the four rightmost bits on the DIP Switch is only displayed on the bits 6, 5, 4, and 3 of PORTB (the LEDs). The figure shows an example on the Dragon12-Light Board: the number 1110 is shown on the bits 6, 5, 4, and 3 while the other LEDs are off.

```
ROMStart    EQU  $4000
; code section
ORG   ROMStart
Entry:
_Startup:
LDS   #$4000
movb #$FF, DDRB
movb #$00, DDRH
showDIPSW:  ldaa PTH
/* Write instructions here */
staa PORTB  ; Contents of register A are written on PORTB
bra showDIPSW
```

/* End of your instructions */
PROBLEM 3 (40 pts)
- Given the following Assembly code, specify the \( SP \) and the Stack Contents at the given times (right after the colored instruction has been executed). \( SP \) and the Stack Contents (empty) are specified for the first instruction (LDS #$4000).
- Specify a value in the instruction addb that would make the branch instruction bcs branch to mloop.

\[
\begin{align*}
\text{SP: } & \quad \text{SP: } \quad \text{SP: } \\
0x1000 & \quad 0x1000 & \quad 0x4000 \\
0x1001 & \quad \vdots & \quad \vdots \\
0x3FFF & \quad \text{SP} & \quad 0x3FFF \\
0x4000 & \quad 0x4000 & \quad \leftarrow \text{SP} \\
0x4001 & \quad \vdots & \quad \vdots \\
0x400F & \quad \text{SP} & \quad \text{SP} \\
\end{align*}
\]

```
ROMStart EQU $4000
; code section
ORG ROMStart

Entry:
_Startup: LDS #$4000

mloop: movb #$7C,1,-SP
       movw #$FE,2,-SP
       ldd #$BEEF
       bsr myfun
       leas 3,SP
       addb #$____
       bcs mloop

forever: bra forever

; Subroutine
myfun:  pshb
       psha
       leas -2,SP;
       movw #$BED, SP
       leas 2,SP;
       pula
       pulb
       rts
```