CSE 232

Systems Programming

Assignment 4

Purpose of the Assignment: Purpose of this assignment is to help you gain experience on time delays on Motorola M6800 processor.

Q1) For the example program below, write down how many cycles each instruction takes. Then, pick a random time *t* between 0.2 seconds and 1 second. Calculate what ? should be so that the program below creates *t* seconds of delay. The clock frequency of the processor is 1MHz.

	Cycles
LDX #?	
L: CPX #0	
BEQ FIN	
LDAA #20	
LDAA $120	
LSR $120	
LSR $120	
LSR $120	
STAA $120	
ASLA	
ASRA	
CLRA	
DEX	

BRA L	

Q2) Write a program which operates on an array, whose beginning address is located at 90- 91H, and ending address is located at 92-93H. For each element *n* in the array, your program should wait for *n* seconds. Then, if the element is less than zero replace it by 0, otherwise replace it by 1. In order to wait 1 second, you can use the subroutine that is given below. The subroutine saves the contents of A, B, and X register upon start and restores the values before returning; therefore you can assume that the contents of A, B, and X registers will not change when you call the subroutine.

Also note that the subroutine does not cause a 1 second delay in theory; but since the emulator runs much slower than the emulated processor, it should take approximately 1 second in practice.

```
        .org $2000
        PSHA
        PSHB
        STX $1FFE
        LDX #10
L       CPX #0
        BEQ FIN
        LDAA $0
        INCA
        DEX
        BRA L
FIN     LDX $1FFE
        PULB
```

```
PULA
RTS
.end
```