```
;-------------------------------------------------------------------------------
; MSP430 Assembler Code Template for use with TI Code Composer Studio
;
; ECE 2560 Final Exam -- Autumn 2023
;-------------------------------------------------------------------------------
            .cdecls C,LIST,"msp430.h"       ; Include device header file

;-------------------------------------------------------------------------------
            .def    RESET                   ; Export program entry-point to
                                            ; make it known to linker.
;-------------------------------------------------------------------------------
            .text                           ; Assemble into program memory.
            .retain                         ; Override ELF conditional linking
                                            ; and retain current section.
            .retainrefs                     ; And retain any sections that have
                                            ; references to current section.
;-------------------------------------------------------------------------------

RESET       mov.w   #__STACK_END,SP         ; Initialize stackpointer
StopWDT     mov.w   #WDTPW|WDTHOLD,&WDTCTL  ; Stop watchdog timer

;-------------------------------------------------------------------------------
; Main loop here
;-------------------------------------------------------------------------------

            ; Configure Timer B0 to throw interrupts
            bis.w   #TBCLR, &TB0CTL             ; reset timer
            bis.w   #TBSSEL__ACLK, &TB0CTL      ; source is ACLK
            bis.w   #MC__CONTINUOUS, &TB0CTL    ; continuous mode
            bis.w   #CNTL__12, &TB0CTL          ; counter length = 12 bits
            bis.w   #ID__4, &TB0CTL             ; divide freq. by 4
            bis.w   #TBIE, &TB0CTL              ; enable interrupts
            bic.w   #LOCKLPM5, &PM5CTL0         ; Disable power lock

            ; Configure LEDs
            bic.b   #BIT0,  &P1OUT              ; Red LED off
            bis.b   #BIT0,  &P1DIR              ; Direction to output
            bis.b   #BIT7,  &P9OUT              ; Green LED off
            bis.b   #BIT7,  &P9DIR              ; Direction to output

            nop
            bis.w   #GIE|LPM3,  SR              ; Enable general interrupts and LPM3
            nop

main:       nop
            jmp     main


;-------------------------------------------------------------------------------
; Interrupt Service Routines
;-------------------------------------------------------------------------------

Timer_B0_ISR:
            bit.b   #TBIFG, &TB0CTL             ; Check source of interrupt: is it B0?
            jnc     return_from_ISR

toggle_lights:
```

```
58              xor.b   #BIT7,  &P9OUT             ; Toggle green LED
59              xor.b   #BIT0,  &P1OUT             ; Toggle red LED
60              call    #delay                     ; delay
61
62  return_from_ISR:
63              reti                               ; Return from interrupt
64
65  ;-------------------------------------------------------------------------------
66  ; Delay
67  ;-------------------------------------------------------------------------------
68
69  delay:
70              push    R10
71              nop
72              mov.w   #0xFFFF, R10
73
74  countdown:
75              dec.w   R10
76              nop
77              nop
78              jnz     countdown
79
80              pop     R10
81              ret
82
83  ;-------------------------------------------------------------------------------
84  ; Stack Pointer definition
85  ;-------------------------------------------------------------------------------
86              .global __STACK_END
87              .sect   .stack
88
89  ;-------------------------------------------------------------------------------
90  ; Interrupt Vectors
91  ;-------------------------------------------------------------------------------
92              .sect   ".int50"                ; Timer B0 Vector
93              .short  Timer_B0_ISR
94
95              .sect   ".reset"                ; MSP430 RESET Vector
96              .short  RESET
97
```